

COMPUTERWORLD

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Mini Revitalizing This Mainframe

By Marcia Blumenthal

CW Staff

WALTHAM, Mass.—Although the size of Honeywell, Inc.'s installed base is second only to IBM's, the profitability of its computer business is among the lowest of the five mainframes considered IBM's traditional rivals in the general-purpose computer market.

Honeywell

This is the fourth in a series of profiles of IBM competitors in the general-purpose mainframe area.

With the other mainframes now reaping record profits from their sizable installed bases, Honeywell's low profitability contradicts industry trends.

Despite continued low profits, however, Honeywell's success with its Level 6 minicomputer and its revamped marketing strategies is beginning to pump steam into profits.

Honeywell reported a 10% pretax margin for its computer business last year, but one highly regarded industry analyst calculated that margin closer to 5%. This is because Honeywell does not include some expenses, such as interest, in its pretax figures.

By comparison, NCR Corp. and Burroughs Corp. last year had pretax margins of 13% and 20%, respectively.

Market researcher International Data Corp. (IDC) pegged Honeywell's installed base of general-purpose mainframes at 13,353 units, or 7.9% of the total dollar value of units installed. Last year the company shipped 5.7% of the dollar value of all mainframes, third after IBM and Univac.

The disparity between Honeywell's profitability and market position is

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IBM's Watson Reported in Line For USSR Post

By E. Drake Lundell Jr.

CW Staff

WASHINGTON, D.C.—The "IBM connection" in the Carter Administration is growing larger, in spite of the fact that that same Administration is suing the computer giant on antitrust charges.

The connection grew stronger last week with reports that Thomas J. Watson Jr. will be named U.S. ambassador to the USSR. Presently he is on the IBM board of directors and serves as chairman of its executive committee. He was chairman of the corporation until 1974.

Watson, if he is confirmed to the post, will be the eighth person with IBM connections to hold a high-ranking position in the Carter Administration. Six of the others are serving in the Carter Cabinet.

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Users With 4300s on Order May Be Waiting Three Years

By Marcy Rosenberg

CW Staff

It's not quite like marking time for Godot, but some U.S. users will have to wait almost three years before they receive delivery of IBM 4331 or 4341 systems.

IBM announced delivery schedules for 4300 series machines to individual customers last week. Several users told *Computerworld* their first systems won't arrive until the first quarter of 1982.

And one IBM sales office said the bulk of its 4300 shipments would not go out before the third quarter of 1980. As one New York customer put it, "It's worse than the gas lines."

Typical of the users surveyed were International Data Corp. (IDC) in Waltham, Mass., and Mount Sinai Medical Center in New York. IBM will deliver a 4331 system to IDC in February 1982 and ship the hospital's 4341 system a month later.

Delivery stretch-outs will also take a toll on users who placed multiple orders. In these

cases, most customers are slated to receive one unit per year. That means users won't receive their second machine until one year after delivery of the first, leaving many with only two or three of their systems by 1982.

Lessors, Dealers Hit Hard

Particularly hard-hit as volume customers are computer equipment lessors and dealers, many of which ordered 4300 systems in quantities of 100 or more. Interviews with third-party vendors found first delivery schedules for 4331 systems ranging from the third quarter of this year to the fourth quarter of 1980.

The earliest 4341 delivery reported in the third-party community was third quarter, 1980; the latest date was third quarter, 1981. All lessors and dealers interviewed indicated they have not received 4300 shipment schedules beyond 1982, nor have they been given timetables for delivery of 4300 peripherals, including controllers, disk drives and tape units.

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Deadline May Be Extended Reprieve Near for Payroll Changes

By Marguerite Zientara

CW Staff

WASHINGTON, D.C.—DPers having difficulty implementing payroll system changes arising from the Internal Revenue Service's (IRS) new withholding and reporting requirements [CW, May 28] may have until the end of the year to complete the changeover.

According to an amendment to the IRS regulation proposed by Rep. Bill Archer (R-Texas), the effective date of the rule would be extended six months beyond July 1, the original effective date.

However, the amendment carries an option that would permit anyone who has already made the necessary programming changes to go ahead and implement the regulation on July 1.

The IRS regulation calls for employers to make advance Earned Income Credit (EIC) payments to eligible low-income employees with every paycheck. Presently, the payment is made once annually by the federal government.

Estimates of reprogramming efforts involved for a medium-size installation approach one man-month, at an average cost of \$5,000.

A hearing on the amendment will be held Wednesday, June 27, before the House Select Revenue Measures Subcommittee. A "battery of witnesses" is scheduled to testify, a congressional aide said.

While a one-day hearing is "probably not enough time" for any action to be taken on the amendment, the full committee's "Report on the Technical

Corrections Act" directed the Treasury Department not to impose penalties for noncompliance initially if there is some "good faith effort" toward compliance on the employer's part, according to David Brown, an aide to Rep. John Cavanaugh (D-Neb.).

"The way I understand the IRS normally works in that kind of a situation," Brown said, "the likelihood is

that the standard for what constitutes 'good faith' will get tougher and tougher after September and October as we approach the end of the year."

Brown said he expects some kind of House action on the matter by July 15.

Cavanaugh originally introduced a bill that would have delayed the effective date 18 months. The Archer amendment was a compromise.

Started Early, Journey Ends At \$10 Million Responsibility

By Marcy Rosenberg

CW Staff

CHICAGO—Once they were fledglings, armed with industry jargon and content to nestle in the computer room. But DP professionals are growing up along with their industry and starting to venture out of the technological womb to nest in higher places.

For Lloyd R. Brubaker, 40, that journey began earlier than most and led him to a comfortable niche as vice-president of management information services (MIS) and a director of Swift & Co., a \$4 billion food processor.

Swift spends about \$10 million a year on MIS and leaves to Brubaker the direct responsibility of setting MIS department policy. He decides how to run and staff the operation, maps out the reporting structure and relationships among various

field units and taps application needs and priorities—all with a

The business community is calling for a new kind of DP manager—not merely a technician, but one who can mold the DP function to fit the needs of the corporation.

This is the third in an occasional series of profiles of computer-trained professionals who climbed to the executive ranks by making the transition from technologist to businessperson.

watchful eye to returns on investment.

Under his thumb are some 150

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The trouble with progress is that it always ends up inconveniencing *somebody*. Take the strange case of IBM's five DOS sorts.

Until fairly recently, these Boys from Armonk had the DOS sorting turf pretty well to themselves. We won't say they had a monopoly. But, well, we did notice that they laughed a lot on the way to the bank!

Then — shazzam — everything changed. A couple of leading-edge DOS/VС users left their windows open one day. The next thing you know in flew this big new sort. It announced that it was SyncSort DOS and that it "aimed to clean up DOS sorting" the way it had OS.

Sure, there were chuckles at first. But when the big fellow in the red suit sat down to the computer to sort the laughter stopped. Because it soon became apparent that DOS/VС really did have a "Supersort" for the first time.

Since then SyncSort DOS has flown into the windows of about 400 DOS centers. The reason is simply *superperformance*. In comparison with any one of the IBM DOS mob, SyncSort DOS will yield resource savings of:

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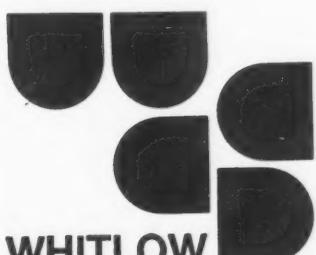
If you'd like to see what our Supersort can do unto your sorting load, benchmark it. The benchmark is to sort selection what the fingerprint is to crime detection!

The next time a suspicious sort wearing baggy long johns and a counterfeit S pinned to its chest shows up, call us. We'll send over a SyncSort DOS faster than a speeding bullet — provided traffic isn't too bad.

As soon as it arrives, say something like: "Okay, boys, you both claim to be supersorts. Let's see which one of you can leap over this towering load in a single bound."

Only please leave the window open. Because when that other sort gets a look at the benchmark results, it's liable to take a flying leap into outer space.

And we sure get tired of cleaning up that broken glass!



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Installed Base Strong, Profitability Weak . . .

(Continued from Page 1)
partly a result of the way the firm has built this installed base. Acquisition has been a major strategy for Honeywell.

"Where you have a series of amalgamations, mergers and product lines, it takes a while to become profitable to the extent you want to," Stephen G. Jerrits, vice-president and general manager of the U.S. Information Systems Group, explained.

Unlike most mainframers, Honeywell started with a "zero installed base" when it entered the computer business 25 years ago, Jerrits noted. Until then Honeywell's main line of business had been environmental and industrial control systems.

Today, control systems represent about 50% of Honeywell's business and is highly profitable. Last year the pretax margin on the controls sector of the business was nearly 16%.

The first major boost to Honeywell's installed base came in 1970, when it acquired General Electric Co.'s computer business, including GE's foreign subsidiary, Bull General Electric. Honeywell doubled the size of its customer base overnight.

Despite this acquisition, neither Honeywell nor GE had any position in the large-scale system segment of the mainframe market. "In 1970, both companies had fewer than 100 large-scale systems installed," Jerrits recalled.

The most important aspect of that merger was Honeywell's acquisition of GE's Gcos, which is recognized in the industry as one of the most sophisticated operating systems.

GE's equipment was not really geared for commercial applications, which was Honeywell's primary orientation, Jerrits claimed. Therefore, using the Gcos software, Honeywell developed the 6000 series, adapting GE's 600 series to that product line. Today the 6000 series reaches the power range of IBM's high-end 370s.

Also using Gcos, Honeywell developed its own high-end series, the Level 66. When it was introduced in 1974, the Level 66 was viewed as an upgrade vehicle for Series 6000 users.

Jerrits credits Honeywell's commitment to the large-scale equipment sec-



Stephen G. Jerrits, Vice-President and General Manager, U.S. Information Systems Group

tor of the industry, culminating in the Level 66 introduction, as a major turning point in the company's position in the market. Honeywell today has 1,800 large-scale systems installed or on order.

Arrangement With Xerox

In 1976, Honeywell took over the maintenance and service of Xerox Corp.'s computer base. Xerox retained the equipment investment on its books, and the two firms share in the revenues generated from maintaining that base.

Honeywell still sells Xerox equipment to the Xerox user base, but Xerox does not share in these revenues.

Although it is still selling Xerox equipment, Honeywell is aiming to upgrade Xerox users to its Level 66 equipment. Recently, the firm introduced its Level 66/DPS/C and 66/DPS/B3 systems, geared to the mid to high end of the Xerox base, and just shipped a test site unit to a user.

While users are looking forward to the upgrade, they are reserving judgment on the product. One Xerox user noted that the disk and memory prod-

ucts supplied by Honeywell to date are good, but "not as state-of-the-art as users would like them to be."

"Xerox users are quite a bit more sophisticated than the general Honeywell user, and that is probably one of the problems — we don't fit the standard mold," he added.

However, Xerox users view the new 66 product as an attractive upgrade. "It's coming slowly, but it appears attractive," he said.

The ability to convert GE and Xerox users to a homogeneous Series 60 general mainframe product line is a challenge Honeywell still has to meet to improve its prospects for profitability, Jerrits remarked.

CML Chips Out

Although Honeywell is forging its way into the large-scale sector, it has yet to introduce a processor that matches the power range of IBM's Series 30. Last year the company withdrew plans to market its answer to Series 30, the Level 66/Model 85, saying it would offer its users other alternatives to achieve more power with their current systems.

To date, Honeywell has provided a high-speed cache which improves throughput and performance and some software enhancements, Jerrits noted. He would not disclose when the company would introduce its high-end product, but wryly conceded, "Maybe later this year."

Whenever it is introduced, the product will not incorporate current mode logic (CML) chips. Honeywell dropped plans to market the 66/85 because it could not develop CML chips cost-effectively.

Although Honeywell will not utilize CML circuits in any near-term products, CML development is still part of Honeywell's research program, Jerrits said. The company is about halfway through the process of designing these circuits, he added.

Regardless of efforts to jump on the large-scale system bandwagon, until recently Honeywell had not gained particular strength in any specific industry or equipment sector, one analyst pointed out.

"As more aggressively priced products get into the mix, companies with no niches will suffer from declining or flat margins," he said. "A company cannot leverage profits if it's a 'me too' company."

An End to 'Me Too'

But with the introduction of its Level 6 minicomputer, Honeywell is on its way out of the "me-too" syndrome.

Those minis are being designed as multifunction units to be used in a distributed processing environment.

While Honeywell prefers to sell these communications-oriented minis to its own user base, it also provides an interface to IBM equipment.

Last year 60% of Level 6s were sold to its own base; the remaining 40% represented new users, Jerrits noted.

"They are shipping Level 6s like crazy," according to William Becklean, vice-president of Bache Halsey Stuart Shields, Inc. Becklean's enthusiasm over the Level 6 is matched by both other analysts and users. Honeywell has already captured a 2% share of the minicomputer market, IDC estimated.

The fervor created by Level 6 resulted

from a major strategic turnaround at Honeywell. While Honeywell has been in the mini business for a long time, its products were usually sold on an OEM basis and a large portion of the sales were to other Honeywell divisions. Now the Level 6 is primarily — 60% — marketed to end users.

But Honeywell has not abandoned the OEM mini marketplace, particularly the system reseller who adds value to the hardware. Honeywell is beginning to recoup its investment in a separate reseller marketing program, Jerrits said.

Earlier this month, the firm signed a multimillion-dollar contract with Paradata, Inc. for the distribution of Level 6s. Paradata will sell smaller Level 6s primarily to companies with annual revenues of \$50 million or less. Honeywell is confident this move will increase its presence in the small business sector of the industry.

Moreover, Honeywell is working diligently to develop data base management systems for its minis.

Toehold in Terminals

In addition to the momentum gained through its Level 6s, Honeywell is vying for a position in the intelligent ter-



Clarence W. Spangle, President, Honeywell Information Systems

minal market. Through the acquisition of Incoterm Corp. in late 1977, Honeywell gained a toehold in the banking and airline industries.

Incoterm makes terminals that connect primarily to IBM mainframes, but Honeywell is now adapting those products for use with its own mainframes. Although not major product lines for Honeywell, last year the firm acquired Syntek, Inc., custom semiconductor device manufacturer, and Spectronics, Inc., a fiber optics manufacturer.

But individual products are not the key to future growth, according to Jerrits. Rather, the path to growth and profitability is in finding ways to tie together Honeywell's mainframe, minicomputer and terminal lines.

The introduction of its Factory Management System at the National Computer Conference earlier this month was a step in that direction. Honeywell claims the system is the first to bring the full power of distributed process-

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While Jerrits sees the long-range need for increased profitability, he is not making heroic cost-cutting moves. "I'm instituting growth — adding people and spending on research and development," he asserted.

Gallic Aid

A substantial boost to the company's revenues and earnings is provided by CII-Honeywell-Bull S.A. (CII-HB), the French firm of which Honeywell owns 47%. Revenues from CII-HB added nearly \$1 billion to the firm's computer revenues of \$1.2 billion last year. Pretax margins on CII-HB's sales are much higher than Honeywell's.

Honeywell was the target of much criticism in 1976 when it sold off 19% of its profitable French affiliate, Compagnie Honeywell Bull S.A., merging with the less profitable Compagnie Internationale pour l'Informatique S.A., realizing a \$12 million net profit from that transaction.

Despite this criticism, CII-HB retains a healthy position in the European computer industry, holding some 10% of the European market, second only to IBM, IDC noted. The firm also provides Honeywell with a substantial portion of its R&D funding.

In addition, now that CII-HB is a French-controlled company, it can benefit from government-sponsored development grants and can sell DP equipment to the government. The French government is highly nationalistic when it comes to purchasing DP equipment.

Hard Time From U.S.

Ironically, it is the U.S. government that is giving Honeywell a hard time about its products. The I/O channel interface standards recently adopted by the National Bureau of Standards in effect makes mainframes conform to IBM's I/O channel interfaces.

Honeywell, which does a substantial business with the federal government, has said it would not change its I/O channel interfaces to conform to government requirements. Jerrits said the

company is waiting to see what kind of waiver policies the General Accounting office will adopt for procurement.

"If the federal government adheres to its standards strictly, Honeywell will not reorient its product," he declared. "In the long run the new standards will not be the standard. Even [IBM Chairman] Frank Cary recently sent a letter to government officials opposing the standard."

Although Jerrits doubts the government will adhere to the new standards, the possibility remains of having to take up the slack if the federal sector business is lost. Honeywell claims 24% of the total public-sector market.

Aside from government business, Jerrits said Honeywell derives about one-third of its revenues from the

manufacturing sector.

While other companies, such as NCR, have been refining their industry-specific marketing strategies, Honeywell just recently began marketing by industry rather than geographically. "In some cases we are late, but we have really been doing industry marketing all along, so the transition is not so radical," Jerrits said.

For example, Honeywell has entire national branches selling to the federal market and the automotive, energy and communications industries.

Although Honeywell has had its share of problems, the firm now appears to be approaching the market in a cohesive manner. "Honeywell is doing better than I thought it would," one analyst concluded succinctly.



Edson W. Spencer, Chairman and Chief Executive Officer, Honeywell, Inc.

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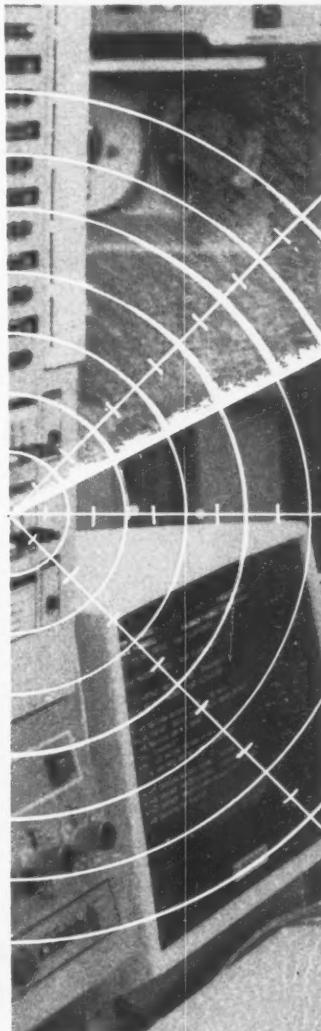
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Tape Management System | <input type="checkbox"/> CA-DYNAM/FI
File Independence Facility |

CW25

Some Users May Wait Three Years for 4300

(Continued from Page 1)

IBM would not disclose its latest scheduled shipment date for 4300 series equipment; the firm also would not disclose how many orders it has received. "Customers were individually scheduled and, as such, we don't have a published delivery schedule," a spokesman said.

Industry observers speculated, however, that as many as 50,000 systems were ordered.

Interim Solutions

The protracted "E series" deliveries took some users by surprise and will cause many to scramble for interim solutions to the need for increased capacity.

Lessors and dealers are counting on an increased demand for additional computing power on a temporary basis to breathe life into the market for used or leased IBM 370 equipment. That market has, for the most part, been frozen since IBM announced its 4300 series in January.

Predicting an "overall short-term strengthening" of the third-party 370 market, Edward Cherney, president of CMI Corp., further forecast a jump in lease rates and purchase prices for used 370/138, 148, 158 and 168 equipment within the next 30 days. As for his own firm, a computer lessor and dealer, "I can't arbitrarily say we'll raise our price" or by how much because "it's a function of supply and demand."

And like most third-party vendors, CMI is not sitting on a huge inventory. "Any dealer or leasing company that's doing its job will have 90% to 95% of its inventory committed at all times to future contracts and long-term deals," based on prior market conditions,

Cherney said.

But leasing companies will still be able to offer users substantial savings on 370 leases over IBM's monthly rental plan — especially by taking advantage of IBM rental credits for 18-month or longer accruals, according to Tom McArdle, president of lessor Tiger Computer.

For example, a user would be able to buy from IBM the \$570,000 370/148 if it has been renting for two years for 50% of list, or \$285,000. "The lessor who buys the system from that user for \$285,000 could then lease it back to him for 15% to 40% less per month than under IBM's plan," McArdle explained.

The outlook for a 4300 leasing business, however, may not be so rosy. "There's not a very large market for 4300 leases," maintained Ken Pontickes, Comdisco president, "because IBM's aggressive 4300 pricing will discourage users from leasing," as will IBM's own two-year 4300 lease plan.

"Maybe if we had 4300 systems

available in quantity, people would lease them," Pontickes said.

No Pattern Evident

Unfortunately, Comdisco, Inc., like many other lessors, ordered multiple 4300 systems for lease to other users, and it doesn't look like quantity deliveries are forthcoming.

Comdisco, which ordered "over 100" 4300 machines, won't see its first 4331 or 4341 system until the fourth quarter of 1980; its second of each won't arrive until the fourth quarter of 1981. But "we're going to hang in," Pontickes said.

There doesn't seem to be a pattern to deliveries scheduled to the third-party market. Tiger, which ordered 100 each of 4331 and 4341 systems, will get its first 4331 in the second quarter of 1980; its first 4341 is scheduled for delivery in the third quarter of that year. And, like Comdisco, the second of each system will arrive exactly a year later.

Similarly, CMI's multiple orders are

spaced a year apart, but the firm will get its first 4331 this September. Its first 4341 is set to arrive in August 1981.

'Apparently Not Popcorn'

All in all, the 4300 shipment schedule has "created a definite open void in the marketplace that requires additional [millions of instructions per second (Mips)] to stay even," maintained William Grinker, president of the Computer Dealer's Association.

Grinker refused to discuss the situation of his own firm, American Computer Group. However, he expects a surge of increased activity in the used computer and leasing business which could create "a serious shortage of IBM 370, Series 30 and even 360 equipment over the next few years."

As CMI's Cherney said, "The rumors were that 4300 deliveries would either be spread out over two or three years or that IBM would produce them like popcorn. It's apparently not popcorn."

Watson in Line for Ambassadorship

(Continued from Page 1)

And Watson will be the highest ranking IBMer to move into the Administration, handling the sensitive Moscow embassy just over a decade after he decided not to have IBM do business with the Soviet Union for fear of conservative opinion in the U.S. — a decision that was changed just a few years later when IBM became the first U.S. computer maker to have a Moscow office.

Watson has been intimately connected with IBM all of his life. His father was president of Computing-

Recording-Tabulating Co., which he renamed International Business Machines Corp. in 1924.

Watson, a well-known yachtsman and an avid skier, was a pilot in World War II and returned to IBM after the war, becoming president in 1952. He signed the consent decree with the government in its earlier antitrust suit against the firm — which was settled out of court in 1954 — and is given the credit for moving the firm firmly into the computer business.

Break With Tradition

His appointment as ambassador to the Soviet Union will mark the first time in many years the U.S. has not had a career diplomat in the post and may signal a U.S. desire for closer trade ties with the Soviets.

That will be an ironical position for Watson, who visited the Soviet Union in the early 1960s to explore trade possibilities, but decided against a more active trading role at that time because of criticism from such groups as the Young Americans for Freedom, a right-wing youth organization.

However, just a few years later, IBM followed the lead of the British International Computers Ltd. (ICL) and became the first U.S. computer maker to open a Moscow office. The company has since shipped several systems to the Soviets, including a 370/158 for the Kama River truck plant.

The news of Watson's imminent appointment came when President Carter was in Vienna to sign the Salt II agreement. Watson, as head of the General Advisory Committee to the President on Arms Control and Disarmament, was the only non-Administration figure invited to the signing ceremonies.

Also at the signing ceremonies were Secretary of State Cyrus Vance, a former director of IBM, and Secretary of Defense Harold Brown, also a former IBM director.

In addition to those two Cabinet members, Secretary of Housing and Urban Development Patricia Harris was a director of IBM until her appointment to the Cabinet, and Attorney General Griffin Bell's law firm had

worked for the corporation while he was a partner.

Other Ties

Other Cabinet members with some connections to IBM include Juanita Kreps, who reportedly was recommended as Secretary of Commerce by IBMers after Jane Cahill Pfeiffer, a former IBM vice-president, turned down the post. In addition, Joseph Califano, Secretary of Health, Education and Welfare, was said to hold a large block of IBM stock before his appointment to the Carter Cabinet.

And even on the next level of government, people with IBM connections hold prominent positions. For example, Dr. Lewis Branscomb is a member of the President's Science Advisory Board and also an IBM vice-president. And Warren Christopher, a high official law firm which last year did more than \$7 million worth of business with IBM.

For years, IBM brass has pursued a policy of supporting both Republican and Democratic candidates for President, but it was greater than ever in the past — with the possible exception of the election of Dwight D. Eisenhower in 1952.

One of Eisenhower's greatest supporters was Thomas J. Watson Sr., who helped the ex-general land the post of president of Columbia University while he mulled the possibilities of a Presidential campaign.

Watson Sr. also supported Eisenhower during the 1952 election and just two years later, the Eisenhower Administration negotiated what many viewed as a weak consent decree with the firm — the result of an antitrust case brought by the Truman Administration.

The two boys in the family — Thomas Jr. and the late Arthur K. — tended to support political figures, with Thomas supporting Democrats and Arthur supporting Republicans, for which he was rewarded with the ambassadorship to France during the Nixon Administration. Arthur had contributed \$300,000 to the 1968 Nixon effort.

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Judge Recesses U.S. vs. IBM to Study Motions

By Connie Winkler

CW Staff

NEW YORK — The IBM trial has been recessed for two months to allow Judge David N. Edelstein to work on the motions both parties "clobbered" him with before the April 10 break.

"I have not been playing tiddley-winks. I have not been on vacation," Edelstein said about the break, which

is unusually long even for this trial, now in its fifth year.

Both IBM head counsel Thomas D. Barr and Justice Department trial team head Robert J. Staal said they knew only what Edelstein had said on the record — that the recess was called to allow the judge to act on motions.

"It's impossible to ride both horses at one time, and I can't turn the motions

over to an assistant as I could in a company," Edelstein said about the need for time to consider motions apart from trial time. "Every night and in the wee hours of the morning, I was inundated with an inordinate number of motions that couldn't be read."

However, Edelstein said he expected the trial to resume "soon."

The judge also stressed the importance of the motions, particularly those on discovery — requests for documents from the other party — to the rest of the U.S. vs. IBM antitrust trial and to other large, complicated trials.

"There are matters of great significance in these motions, matters that go far beyond this case," Edelstein said. He also noted the extensive legal research that goes into deciding each

question and writing court orders.

Between March 14 and April 10, Edelstein received 14 motions. Since then, he has received three more.

The most important of these is known as the Cary document motion. The Justice Department's Antitrust Division argued it needs lists of documents in order to cross-examine IBM Chairman Frank T. Cary, who is to be a witness. In strong language, IBM has refused to hand over the documents.

The Cary motion is still pending, another has been withdrawn and the remaining 12 have been ruled on. IBM has responded to some of Edelstein's requests for documents by withdrawing the witness involved. Of the three motions submitted to the court since April 10, Edelstein has acted on two.

Cary Takes Witness Stand In Transamerica vs. IBM

By Jeffry Beeler

CW West Coast Bureau

SAN FRANCISCO — IBM called its highest ranking officer to the witness stand recently in an attempt to refute Transamerica Computer Co.'s charges that the industry giant sought to restrain competition through its leasing plans and pricing practices.

In his first day of testimony at the Transamerica vs. IBM antitrust trial, IBM Chairman Frank T. Cary denied his firm lost money several years ago when it introduced the 2319A and 2319B disk units.

Cary also denied, at least indirectly, that his company was seeking to oust competitors from the disk systems market when it adopted a fixed-term plan (FTP) for leasing in May 1971.

Cary's assertions about the 2319 disk family and the FTP conflicted sharply with two main points of Transamerica's antitrust case. Transamerica maintained that:

- IBM sought to place its competitors in an untenable position by deliberately selling its products at a loss.
- IBM instituted its FTP to punish plug-compatible equipment manufacturers for competing too successfully in the disk systems market.

Between Rock, Hard Place

Earlier in the trial, Transamerica witness Alan Peterson told jurors that IBM's underpricing of the 2319B had cost the firm \$14.4 million in profits. Although the underpricing took its toll on IBM, it hurt the plug-compatible disk system makers even more, according to Peterson, a partner with Arthur Andersen and Co., a Chicago-based accounting firm.

In effect, the underpricing put rival suppliers between the proverbial "rock and a hard place." If they refused to bring their price scales in line with IBM's, they found themselves consistently undersold and faced with a shrinking customer base.

If, on the other hand, they imitated IBM's pricing practices, they found themselves unable to generate enough revenue to stay profitable.

Either way, their ability to compete effectively in the disk systems market was severely strained, Peterson explained.

Cary responded to the underpricing allegations by repeating IBM's familiar refrain that it has always had a policy of recovering all its costs, both direct and indirect.

Demand for FTP

Long before Cary's courtroom appearance, Transamerica had also tried to show that IBM viewed the FTP less as a means of protecting its own mar-

ket share than as a weapon for destroying its competitors.

(Continued on Page 8)

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Job Holds \$10 Million Responsibility

(Continued from Page 1) staffers and the managers of applications development, operations, data administration and two engineering groups.

Brubaker is quick to distinguish himself from a DP manager — an individual who "gets told what to do." On a different plane as an officer of the company, Brubaker reports to the president and is a driver in the decision-making process not only for MIS issues, but also outside that sphere. "I vote on acquisitions, mergers and personnel policies," he pointed out.

Commenting on that cushy seat in the executive tower, Brubaker acknowledged that DPers, often regarded as "staff," face a rougher ride to the top than do marketing, financial or other line managerial types. "Production and marketing have been around for hundreds of years, but we're new kids on the block."

"Not that many guys coming out of the computer industry have made it yet. The profession is young, and people in information services tend to be stereotyped as technicians," largely because "we talk funny."

As for himself, Brubaker said, "I never prided myself on being very technically competent. I was always more of a generalist — a general manager."

Technical Aspirations Squelched

An initial brush with systems engineering in college and later at IBM squelched any technical aspirations he may have had. Instead, he was graduated from California's Menlo College with a bachelor of science degree in business.

After a stint in the Navy, Brubaker joined IBM in 1963. That move, he said, was not a calculated decision, but "dumb luck. They were hiring."

Initially, he designed and installed computers for the industry giant, but then moved into marketing for the Data Processing Division, where he stayed until 1970. By that time, he tired of selling. But his feeling that some of the programs he sold could have been better developed gave Brubaker the itch to run a large DP shop.

Enter Whittaker Corp. in Los

Angeles, which Brubaker described as a large conglomerate and one of a group of companies "that went crazy in the 1960s," with sales jumping from \$15 million to \$1 billion in a short span of time.

When Brubaker came on board, Whittaker had big plans for DP, but was caught in the middle of an austerity program. So Brubaker was hired as an assistant controller, though he performed the functions of a corporate director of MIS with a dotted line responsibility for all DP decisions, including hardware acquisitions.

At first managing only other DPers — about 50 to 60 programmers and analysts — Brubaker was later promoted to director of corporate administrative services, giving him the chance to stretch his chain of command to embrace non-MIS operations such as corporate engineering and real estate.

This transition, for Brubaker at least, was a piece of cake. His secret? "I speak English — not computer English," he quipped.

"Because I came out of a marketing background, I never quit selling. I still interacted daily with the various levels of management to get them to look at MIS as a resource and a tool. Part of a basic sales training is to learn to speak the other guy's language."

Of course, being a "generalist" also helped, he added, proclaiming "any good general manager can run anything." As proof, he cited his next job, supervising 250 programmers and analysts as MIS director at Evans Products Co., a Portland, Ore., lumber company. In his fifth and final year there, he donned a financial planning director's hat in addition to his MIS derby.

"I wasn't a financial planner or an economist, but I saw an opportunity, after the departure of the previous financial planning director, who had reported to the same person I did."

This kind of assertiveness, he believes, is the key to shattering the stereotype of DP as technician, DP as specialist. "I volunteered for assignments that came up, even if they were outside the immediate confines of MIS."

And when Swift needed a business manager with MIS skills, Brubaker

was ready and welcomed. He was elected to the board of directors only two weeks after joining the company "as part of the package."

Dispelling Mysteries

Brubaker admitted his greased path to top management often slides past other computer-trained professionals because "most old line managers did not grow up with DP and are skeptical, if not afraid, of it."

However, these visions are rapidly dimming. "In 10 years, all the mystery will be gone," he predicted. "Senior and certainly middle managers will be very familiar with computers, and the technology will be integrated into all aspects of business."

His crystal ball notion is already coming into focus as the computer industry expands and attracts many more people from other disciplines. The result: "The DP specialist is almost a figment of our imaginations now."

This influx of "generalists," he added, can only improve the quality of



Lloyd R. Brubaker

MIS, if merely by bringing "a less myopic perspective to problems."

Corraling a growing number of application areas, the computer industry will always have room for technical specialists, but Brubaker maintained "they won't end up in the executive suite."

Cary Testifies on Coast

(Continued from Page 7)

Not Expected At Stanford

PALO ALTO, Calif. — Stanford University is not likely to see IBM Chairman Frank Cary as the head of its business school [CW, May 14], according to the head of that school's search committee.

Accounting Prof. Charles Horngren said his understanding was that Cary would continue his duties at IBM through the next year. The post of business school dean will be open in July, when the current dean and former Ford Motor Co. president, Arjay Miller, retires from the position after 10 years.

The position "will not be filled by July," Horngren said, stating that Associate Dean Robert Jedicke will assume the post until a successor to Miller is appointed.

"We are not narrowing our search to alumni of the school," he said. Cary had been mentioned as a likely replacement because he received an MBA there in 1948 and now serves on its advisory board.

business would increase by 24%.

In other testimony, Cary described the computer industry as an increasingly competitive field in which survival depends on an entrant's continuing ability to remain in the technological forefront. IBM, he said, faces competition from many sources including service bureaus, leasing companies, software houses and time-sharing firms as well as other systems manufacturers.

Transamerica's lead attorney Richard Lucas responded to Cary's testimony by presenting an IBM memo in which 60% of the firm's 1966 and 1967 contracts were said to have been competition-free. Lucas also presented a document that estimated IBM's 1961 to 1964 market share at 72%.

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NTIA Official Assails House's 1934 Act Rewrite

WASHINGTON, D.C. — In its effort to rewrite the Communications Act of 1934, Congress may be overlooking the information issues arising from the introduction of new communications technologies, according to a government official.

H.R. 3333, the Communications Act rewrite legislation introduced in the House of Representatives by Rep. Lionel Van Deerlin (D-Calif.), "In its present form does not adequately address the concerns of information policy," the House Communications Subcommittee was told recently.

The issue was raised during subcommittee hearings on a section of the bill that would replace the National Telecommunications and Information Administration (NTIA) with a National Telecommunications Agency (NTA).

The NTA would have primary responsibility for developing and implementing national telecommunications policy and would act as the principal advisor to the President on telecommunications issues.

"Taking into account the overall thrust of the bill, NTA would clearly be a different entity from NTIA or NTIA's predecessors," NTIA Deputy Administrator Stanley L. Cohn told the subcommittee June 12.

Responsibility Not Assigned

In a lengthy prepared statement presented to the House panel, Cohn said, "The bill focuses almost exclusively on the policy issues relating to telecommunications. Generally speaking, it omits any assignment of responsibility in the area that is coming to be called 'information policy.'"

Cohn believes information policy should be concerned with "those issues that emerge from concentrations or flows of information and that display two characteristics:

- "They are generally, although not necessarily, influenced by developments in technology, especially computers and telecommunications.

- "They may have a significant impact on our institutions or on the complex social, economic and political relationships within our society."

"It is not a cliche to say that the U.S. is moving toward an 'information society,'" Cohn continued, noting a recent Commerce Department study that found "more than 50% of our national work effort is tied to the production, use of dissemination of information."

"Naturally, any activity of this magnitude is bound to raise important and complex questions of public policy," Cohn said. "Indeed, a host of information-related issues have already been identified by varied federal commissions, legislators, administrators, information industry spokespersons, civil liberty organizations and consumer groups."

Political Impact

"As we move into the 1980s, the manner in which these issues are resolved — or not resolved — will significantly affect the structure of certain important institutions in our society, and it may substantially alter the balance of power among these institutions."

Cohn explained he was referring to "institutions in the broadest sense — that is, government at all levels, industry, the press and the public." In H.R.

3333, "policy-making authority in this area is not discussed.

"Moreover," he reminded the sub-

committee, "the lines between telecommunications and computers are blurring. So it is unrealistic to limit the

government's policymaking role to those issues relevant merely to telecommunications technology."

Finished Bill Expected by End of July

WASHINGTON, D.C. — The Communications Subcommittee of the House of Representatives announced recently it expects to have a finished Communications Act rewrite bill by the end of July.

The subcommittee said that on July 11 it will begin "mark up" of H.R. 3333, the rewrite proposal sponsored by Subcommittee Chairman Lionel Van Deerlin (D-Calif.).

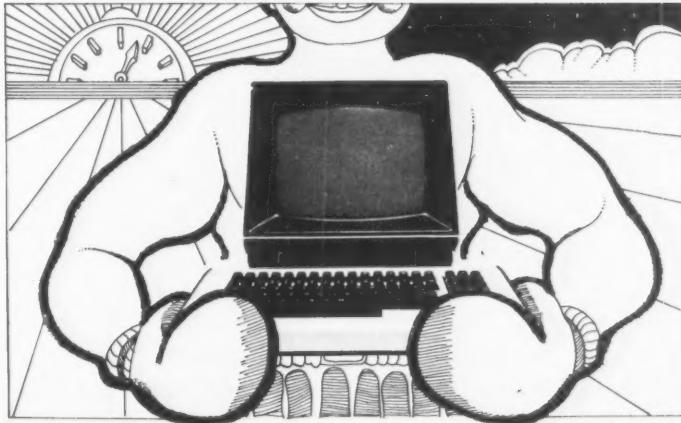
"Mark up" refers to the closed meetings during which the legislation and possible amendments are considered by the committee before a final draft is presented to the full House. "We have scheduled at least seven days of

mark up and will add as many days as may be needed to produce a finished bill by Aug. 1," Van Deerlin said.

H.R. 3333, co-sponsored by Representatives James Collins (R-Texas) and James Broyhill (R-N.C.), has been the subject of lengthy public hearings that began in April and will end June 28. Similar legislation is currently being considered in the Senate.

"I think the subcommittee members have reached some remarkable agreement in many areas covered by this bill," Van Deerlin said in a statement released June 7. "Obviously, we have a way to go yet, and a number of changes may have to be made."

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'It's a Very Strange Feeling'

Women Managers Counsel the Up-and-Coming

By Connie Winkler

CW Staff

NEW YORK — Being a woman in management is like being on an escalator with no handrails. "It's a very strange feeling," according to Jan G. Winston, contract administrator for Aerojet Electro Systems Co. of Azusa, Calif.

How to deal with that strange feeling was the subject of a session at the National Computer Conference here recently. The session, conducted by four hard-hitting women managers, also covered getting into a management position, playing the political games once there and then moving on to new horizons.

"All too often women get into jobs that are the farthest things from management ever imagined. Look before you leap," warned Alyce Jackson, software systems specialist at TRW Defense and Space Systems Group, Redondo Beach, Calif. Jackson started out as a programmer, got a Ph.D. and moved up to top manager via a methodically planned course.

Women should look for jobs

within the power flow of the organization, jobs that are making money for the corporation, Jackson said. This may mean changing companies or departments within an organization.

"Decide early on the job you want, and let it be known," she advised. "There's a difference between being a 'workaholic' and letting someone in a decision-making position know you are a workaholic. You are your own promoter."

Jackson urged women to maintain an harmonious working of mind and body. "Watch your physical and mental health. Coming home from work, grabbing a tuna or grilled cheese sandwich and going to bed just doesn't make it. I know, I tried that for a while."

Jackson suggested that women interested in management should:

- Look for role models — persons in the same job category in which they are interested — and assess their own attributes against the model's.
- Get a college degree in the

field. "People want to know you are able to follow through with a discipline."

- Develop their own career paths. "It is you that should be responsible and develop your own opportunities."

"It can be done," Jackson cheered.

Discrimination Persists

"What is good for women is good for the company," Winston said about the need to bring more women into management. Nevertheless, discrimination persists with less than 5% of managers who are women.

"Women rarely get promotions. They haven't asked for them," she continued.

And once in management, the path is not easy. "Women executives are still rare enough that they must carry out their duties on what is a public stage and in front of an audience that will catch any slip," Winston stressed.

"Management must be played as a game. This is the chief area where many women fail," according to Betty M. Niimi. "Women are so concerned with their own work that they fail to see what is going on around them."

Niimi, now a project manager at TRW Defense and Space Systems Group, Redondo Beach, Calif., told how she played the management game in straightforward terms.

"I form strategies. I make moves. I assume roles to get objectives I feel I need to obtain," she said.

Once in that first management job, the problem is not to be a doer, but to be the coach. "You must make each person feel he or she counts in the organization," Niimi said.

When dealing with peer managers, it's necessary to gain their support, get along with them and — perhaps hardest — impress the boss that you are better than your peers.

Often, dealing with management, peers means learning to compromise and negotiate, a new activity for many women who tend to think in black and white, Niimi said.

"You have to be competitive," she urged. "Go into meetings prepared to score —

you can't always follow."

Points to Consider

Dealing with upper management requires game playing so that women can move ahead, Niimi continued. This means:

- Maintaining an image appropriate to the environment.
- Supporting upper management by fulfilling all its requests. "Making the boss look good makes you look good," Niimi said.
- Being ambitious and letting people know you are.
- Controlling yourself in work and personal life. "You must give the impression of being busy, but not harried," she noted.
- Portraying the image that the job comes first.
- Acquiring the image of a manager who delegates work. Never let upper management see you doing your subordinates' work, Niimi added.
- Gaining visibility within the company by serving on corporate committees and affirmative action task forces and participating in company social activities.
- Being sensitive to management's interests.

Try New Approaches

Traditionally, women have relied on their individual performance and technical excellence to get ahead, according to Linda Taylor, a software manager at Systems Development Corp. in Santa Monica, Calif. But in a publicly held corporation, it doesn't work that way for women.

After landing those management jobs, Taylor told the group to become team members. "Top management is essentially a club. It is in fact the first time you will be working with a management team," she said.

"This differs from first jobs where the positions are essentially vertical and there's little need for groups to work together.

Pleasing Top Management

The lack of women in management is sometimes explained away by the statement that they don't know how to make presentations to management. The problem is not being able to make a presentation, Taylor said.

"You must know the audience. Top management has unique expectations. Use the mode and medium they want," she noted.

One survey showed men spend 60% of their time on work, 20% of their time being visible to their supervisors and 20% with their subordinates.

Women spend approximately 100% of their time on a given project. And therein lies the problem, Taylor said.

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Female DPers Urged to Be More Like Males

By Howard A. Karten

CW Staff

TULSA, Okla. — "Why can't a woman be more like a man?" Rex Harrison asked in "My Fair Lady." Although women in DP need not be like men, they can advance themselves in business organizations by learning the behaviors that men know, according to the author of a recent book on women at work.

Marlene Pinkstaff, co-author with Anna Belle Wilkinson of *Women at Work: Overcoming the Obstacles* and a member of the consulting firm of Dick Pinkstaff and Associates, said in a recent interview that women have not learned some of the critical, job-related behaviors that men know.

"Women have traditionally built their self-images on the need to serve others," rather than feeling that they are people of worth in themselves, Pinkstaff noted. "This is a problem, and women must learn to think of themselves as professionals, to recognize that they have talent and capability, that they can use these [abilities] and that it's perfectly OK for them to be a success on the job."

Can't Beat Them? Join

Men tend to respect a man's opinion more quickly than they do a woman's, Pinkstaff said. To overcome this, "women have to learn how to be competent in a discussion and get some feedback from men in meetings, how to contribute and present themselves as knowledgeable, successful people. You have to present a competent, confident image," she stressed.

Such confidence and competence starts with "doing your homework." After that, it's a matter of learning the interpersonal skills, she said.

The problem is that interpersonal business skills — behavior between two or more people that is not strictly related to information sharing or dissemination — have not been taught formally and "have not been reinforced in women in the past. In fact, such behaviors have been discouraged."

"Women in DP are going to get support from each other, reinforce each other and learn from other women in other fields," Pinkstaff noted. Men have had their own support system for years.

Because DP is a relatively new field within organizations, "it's pretty much wide open for women, and it's drawing younger women, who are perhaps more career-oriented than older

women," the consultant said.

Among the problem areas cited by Pinkstaff were dress in the office, language and emotional behavior. "Dress is very important . . . We hate to think we have to emphasize physical appearance, but let's face it — the first time someone sees you, that's how they evaluate you, on how you look.

"I won't go so far as to advocate wearing a uniform, but in my personal experience, we've discovered that there is certain attire that is more appropriate in an office and commands more respect [such as] a skirt, a tailored dress or a suit," Pinkstaff said.

Language, too, is important, in Pinkstaff's view. Men and women often use different metaphors, she observed, and while women don't necessarily have to speak the language of men, "they have to understand it."

For example, if a man said, "What we've got to do now is grab the ball and run with it," a woman "had better know what that phrase means; it should not be foreign to her. It doesn't mean she has to use that particular phrase, but I don't think it would alienate people if she did," Pinkstaff said.

Most metaphors that men use fall into one of three classes, she noted: military, sports and sex. A woman could use sports or military metaphors without being offensive, providing the metaphor was used correctly; however, "I tend to think sex metaphors would be a little shocking; you won't find many women who use them."

Perhaps one of the most important behaviors for women to learn, Pinkstaff said (acknowledging that it would be a controversial remark), is that women should control their emotions in a business setting. "Don't cry [on an occasion when a woman might be tempted to do so]. Go back to your office, do whatever you have to do — but don't cry," she advised.

This does not mean that a woman must learn to behave like a man, Pinkstaff maintained. "It isn't necessary for a woman to give up her femininity; you can remain a woman and be very professional and accepted."

Pinkstaff's book, scheduled to be released shortly, is published by Addison-Wesley Publishing Co., Inc. of Reading, Mass. The cost is \$7.95.

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Law Firm Testifies to Benefits of DP Equipment

By Connie Winkler
CW Staff

NEW YORK — The prestigious law firm of Milbank, Tweed, Hadley & McCloy doesn't file paper — it feeds it all into an IBM 370/158, which will eventually be replaced by dual 4341s.

What's more, the Wall Street firm has immediate plans to replace all its secretaries' typewriters with IBM 3278 terminals. Each secretary will have a terminal, and every three secretaries will share a hard-copy printer, probably a Xerox Corp. 1720 or 1750 with a Diablo Systems, Inc. print mechanism.

In addition, a laser printer will be installed on each of the firm's five floors. Milbank, Tweed already uses two IBM

6670 information distributors to speed printing production.

The firm never throws away any research — "it's stored on-line," explained Francis H. Musselman, a managing partner in Milbank, Tweed. "Instead of going all the way back to the Magna Carta on each legal question, we take advantage of what we've already done."

The major expense has been creating the data base so that everything can be retrieved later, Musselman said. The 158, which will become a 3031 on an interim basis — until the dual 4341s are delivered — has 1.4 billion bits of memory.

Over time, the number of secretaries

in the firm has dropped from 260 to 130. Formerly, junior secretaries were matched one-to-one with junior associates. Now, each secretary works for two professionals. The firm has 200 lawyers, 45 paralegals and 15 fiduciary accountants.

Milbank, Tweed's DP operation is one of the most sophisticated among law firms and therefore a rarity. The neglect of DP in the legal profession was underscored at a recent conference where "Data Processing and the Provision of Legal Services to the Private Law Office" was a topic of discussion. All the speakers called law firms the last of the cottage industries.

"Lawyers are one of the last service industries to take advantage of computers," said Haley J. Fromholz of the San Francisco firm of Morrison & Foerster, who chaired the session. "Lawyers tend to be very conservative and respecters of precedent until proven otherwise."

Musselman's firm started looking at DP approximately 10 years ago when Musselman had to write off \$1 million worth of lawyers' time because it was too stale to bill. Without DP, all the office productivity improvements of the 1970s — copiers, electric typewriters, dictation machines and so on — can only increase law office productivity 1%, Musselman told a group of about 40 lawyers and DP professionals.

"It's become a question of clients paying more or lawyers getting poorer — or both," Musselman quipped.

Changing Litigation

The move toward DP in the law office has also come as a result of the change in the litigation firms now handle. Traditionally, large firms confined themselves to transactions such as large bond sales that involved the expertise of individuals instead of many persons, Fromholz said.

"A large part of a law firm's revenues depended on expertise rather than hours — lawyers didn't concern themselves with production," Fromholz added.

Today's litigation involves the big case rooted in government regulations.

entailing the compilation of statistics and documents and often involving questions of past conduct toward a number of parties over a period of time, as in class action suits.

In addition, corporations are increasing litigious activity against other corporations, fearful that they will be sued by their stockholders if they didn't take action. And because litigation can run on for years and years, the client today wants to know where the legal fees are going.

All this information is best maintained by DP, Fromholz said.

Software Developments

L. Donald Holland of the Atlanta consulting firm of Holland, Shipes & Reames discussed software that was designed especially for law firms and that includes a docket and calendaring system. "Eighty percent of the malpractice suits brought against lawyers are initiated because the lawyer didn't file the necessary papers on time," Holland said.

A conflict-of-interest data base alerts lawyers to new clients whose interests might conflict with those of old clients or of the firm's members.

Most of the software developed for law firms has only been on the market two years, Holland said.

While computers are increasingly popular in the law firms' back offices, lawyers themselves have been less eager to use them for legal research, according to Fred M. Greguras of the Omaha firm of Kutak Rock & Huie.

The most popular computer-assisted research service is Lexis, which was developed by Mead Data Central and which has about 600 terminals around the country, Greguras said. Westlaw, a service of the West Publishing Co., has about 100 terminals. Mead is planning a news release service and a state legislation update service.

The problem with computer-aided legal research to date has been sharing the cost of the terminal. One of the most successful programs involves a shared terminal in an office complex that houses several law firms, Greguras said.

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Attitude Based on Experience Lawyers Defended for Reluctant Use of DP

By Jake Kirchner

CW Staff

NEW YORK — "The reluctance of attorneys to use computers is absolutely unbelievable. Typically, attorneys hate computers," one who should know said here recently.

Lawyers view computers "as a necessary evil at the very best," according to Palmer Brown Madden. A member of the San Francisco law firm of Morrison and Foerster, Madden said lawyers complain that computers break down too often, cost too much and are difficult to explain to their clients.

However, Madden told a recent conference session that attorneys should not be blamed for their reluctance to rely on data processing during difficult litigation. Their reluctance is based on good, sound experience, he maintained.

Computerized litigation support systems, which at present are primarily document-handling systems, are expensive, he noted. Further, attorneys too often are not able to adequately explain their needs to system vendors. And, typically short of management training and experience, they cannot coordinate the time-consuming process of automating a large and complex legal campaign.

Trial attorneys are usually preoccupied with the strategy of a particular case and leave the automation decisions to very junior members of their firms. As a result, "nobody — neither the vendor nor the attorney — knows what they are getting into." This situation has "all the makings of a very expensive failure."

A Vendor's View

Looking at it from a vendor's perspective, John Rome of Informatics, Inc.'s Washington, D.C., office said many of the problems associated with automating litigation support systems are disappearing as more vendors enter the market and as more and more cases are based on DP capabilities.

Whereas anything done in automated litigation support before 1975 was pretty much experimental, Rome, who is also an attorney, predicted that more

Darby Bows Out Of Post at FCC

WASHINGTON, D.C. — Dr. Larry Darby, chief of the Federal Communications Commission's (FCC) Common Carrier Bureau, submitted his resignation June 7.

Philip L. Verveer, currently head of the commission's Broadcast Bureau, was named Darby's replacement.

Darby cited "personal reasons" for resigning after less than one year on the job, but FCC sources attributed the move to disagreement between Darby and the commission over FCC regulations of AT&T.

Darby reportedly was particularly upset that the commission did not act on a Common Carrier Bureau recommendation that AT&T be required to refund about \$100 million to its customers. The company had reported that amount in profits earned in excess of limits set under current FCC regulations.

than 1,000 cases will be automated during the next year. This figure is up from the estimated 15 to 20 cases that were automated during the 1975-1976 period, according to Rome, an Informatics vice-president and director of the firm's DP/legal activities.

Describing computerized litigation support as a "growth industry," Rome said there are three trends evident in that industry:

- "A skyrocketing number of cases will be using computer technology," reflecting the growth in microprocessor technology and the plummeting cost of computer hardware in general.
- Increasing price competition for legal services, resulting in part from the

recent move by law firms to advertise their services, will make DP use by the firms a necessity.

• Use of computer technology in all the very large cases will be a legal standard. In fact, failure to use this technology will soon constitute a form of legal malpractice, according to Rome.

'Not Snake Oil Purveyors'

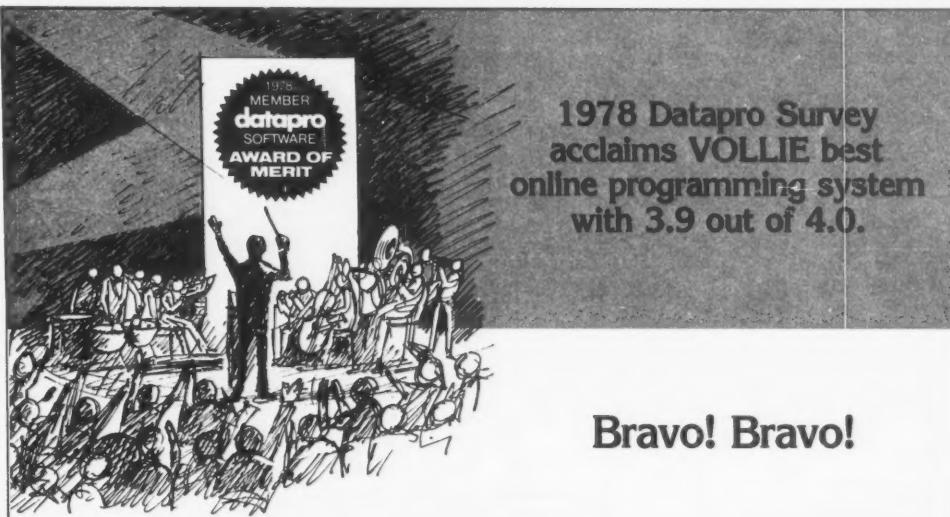
In entering the market, Rome said, vendors must persuade attorneys they "are not purveyors of snake oil. A more harmonious and stress-free relationship" is possible, he believes.

The big problem, according to Rome, is one of communication. The established vendor cannot afford to fail

if he wants to stay in business. Given the proper information by a law firm, the DP contractor is actually better at hitting estimated costs than attorneys are at meeting the estimates they give their legal clients, he maintained.

Rome seconded Madden's suggestion that the systems development responsibility not be left to young, inexperienced attorneys. Rome also advised vendors not to lose sight of the real objective of automating litigation support.

The objective is not to develop any particular system, but to win a case. The system must be tailored to that end, he said, a fact often forgotten by both parties to the contract.



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DP Seen Raising Both Old, New Legal Issues

By Howard A. Karten
CW Staff

NEW YORK — One of the world's newest professions poses familiar as well as unfamiliar opportunities for practitioners of one of the world's oldest professions, panelists agreed at a recent conference session here.

Discussing "Legal Risks: Technical Decisions, Computer Experts and Business Sense," the three lawyers on the panel agreed that while some issues are merely new variations on old themes, such as contract law, other issues — such as privacy and performance — are being raised significantly by computer use.

For example, contracts between users and vendors are simply familiar contracts with new objects, according to Lawrence Robertson, a lawyer with the National Telecommunications & Information Administration in Washington, D.C. However, in some cases — for example, bankruptcy law — repossession could be precluded by the central nature of computers to many businesses, since keeping a computer could be essential for a business to pay off its creditors by continuing its business operations.

New Issues Raised

Some technological areas, however, raise totally new issues. For example, whether a programmer works via terminals or with punch cards could conceivably become an issue in a future case, because how the programmer did his task might be relevant, Robertson noted.

Further, programmers themselves might become pivotal in

some cases, since it is programmers who actually implement the systems promised by the vendor's salesmen.

Similarly, emerging issues such as electronic funds transfer (EFT) could pose new issues in security areas. Whether a company running or participating in EFT took adequate security measures, for example, might be highly relevant in a fraud case.

Moreover, there could be problems in obtaining evidence in some cases because there is often no "paper trial" in fraud cases, Robertson said.

"Perhaps some technical decisions cannot be made without recourse to the possible legal consequences," Robertson observed, citing the alleged software flaws in piping design algorithms in nuclear plant design.

Legal Wrinkles

Agreeing with Robertson, Michael Braun of the Chicago law firm of Feiwell, Galper & Lasky, Ltd. pointed out that contracts between users and vendors are routinely drafted by lawyers with no knowledge of DP. "There is nothing magical about the computer field," he stated, adding that, in terms of litigation, "if the contract is unfair, [when it comes to a trial] forget the contract."

However, there are some wrinkles posed by the nature of DP. For example, under the U.S. Uniform Commercial Code, programming services are not always treated as goods; this could cloud a trial that centered around the issue of whether a vendor was in compliance with a contract.

Citing numerous legal cases, Braun cautioned the audience

'Enormously Fun for Lawyers'

NEW YORK — The DP salesman did his job well, and as the user and vendor celebrated the contract signing with drinks, it was smiles all around.

But nine months later the smiles turned to scowls as both parties became embroiled in a dispute about whether the hardware and/or software performed up to specifications.

"I have come to the conclusion that [these cases] are enormously fun for lawyers and expert witnesses, but no fun at all to the litigating parties," said Matthew P. Mitchell, an attorney with the San Francisco law firm of Feldman, Waldman & Kline.

Mitchell, a panelist at a recent conference session here on legal risks in the DP business, pointed out that in cases that come to litigation, "it is virtually inconceivable that there could be a computer project of any consequence that did not generate large numbers of documents as it progressed... In addition to the jointly prepared documents (which may tend to be relatively innocuous), there will be internal documents

prepared by each team and very often 'private' documents prepared by various team members."

These documents, which are often crucial to proving a case, are "incredibly common" in computer litigation, Mitchell stated.

However, a lawyer "must figure out how to translate the gibberish in the technical documents into meaningful statements that can be understood not only by him, but also by a judge and jury who have spent far less time with the subject matter of the litigation and who have a far smaller interest in understanding."

This is not an impossible task, Mitchell maintained. The lawyer, after understanding the material himself, should ask simple questions, building on each one, "until a witness admits in English that the bottom line of some obscure statement is a significant failure or shortcoming."

That coin has two sides, however. "Stick to the heavy jargon when you're admitting technical shortcomings," Mitchell advised.

that third parties also can easily become involved in litigation. For example, if software is in some way involved in the current DC10 aircraft's prob-

lems, the provider of that software might eventually face legal problems.

"There is no way to insulate against [this exposure]

other than insurance. Vendors should keep this in mind; it opens up such a wide range of exposure that it's mind-boggling," Braun said.

Don't Rely on Oral Assurances From Salespeople, Users Told

By Jeffry Beeler

CW West Coast Bureau

NEW YORK — Before contracting with outside hardware and software vendors, users should do a detailed study of their systems needs and then make sure to list all their specifications in writing.

Too many users neglect to ensure that all their system requirements are clearly specified in their formal contracts. Instead, they rely naively on vague, oral assurances from vendor salesmen, only to discover later they have little or no legal recourse if suppliers violate their unwritten agreements, attorney Richard Raysman warned at a recent conference here.

Raysman, who specializes in contract law, issued his warning in an address that urged users to take several basic precautions when dealing with outside hardware and software vendors.

Extended Warranties

On the hardware side, Raysman urged customers to seek extended warranties from their suppliers. Most standard warranties for purchased equipment expire after only one or two years, he said, but users should insist on longer agreements.

If vendors balk at that suggestion, users should press for an explanation.

In negotiating their warranties, customers should also request a provision that protects

them from "consequential damage" resulting from system breakdowns, Raysman recommended. Many warranties compensate users for destruction of their equipment, but not for the resulting loss of their accounts receivables, invoices or other key data files.

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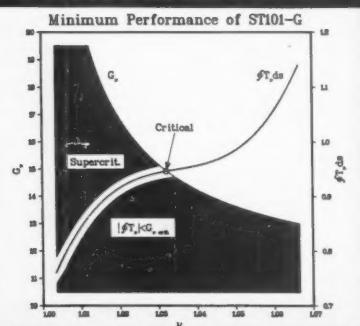
system warranty, however, should cover both hardware and the data it contains, the attorney observed.

Upgrades, Taxes, Delivery

Turning his attention to other requirements for a satisfactory hardware contract, Raysman advised users to in-

(Continued on Page 15)

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DP Needs Greater Than Funds

Crisis in Local Government Blamed on Money

By Jake Kirchner

CW Washington Bureau
NEW YORK — On the first anniversary of the passage of California's Proposition 13, a handful of National Computer Conference attendees recently turned out to hear about the crisis in local government data processing.

Predictably, the crisis was blamed on lack of money at all levels of state and local government. "Data processing is the most costly innovation ever introduced into local government," the session here was told by Craig S. Caywood of the National League of Cities.

Caywood presented "a non-technical perspective" of the problems faced by local officials trying to integrate computer technology into their operations. He summed up the situation by saying, "Their needs far exceed their ability to pay."

Expansion Slowing

Tight fiscal restraints will continue to be the operating environment for most local governments in the foreseeable future. Because of this, "the kind of expansion we've seen [in local government DP usage] over the last 10 years will not continue."

With most municipalities trying desperately to maintain the level of services they now provide their citizens, many government officials see DP more as a luxury than a necessity, Caywood said. However, most of the 40,000 local government jurisdictions in the

U.S. have turned to some DP support during the last decade.

Local government expenditures for DP generally run at about 1% to 3% of annual outlays, while some cities spend up to 5% of their money on DP, although that level is usually not sustained over a number of years, he said. Personnel costs account for about half of DP expenditures in most jurisdictions.

In general, most cities with populations of more than 100,000 have successfully integrated DP into their day-to-day operations and are now looking toward sophisticated management and planning applications, according to Caywood. The priority during the 1980s for smaller jurisdictions "will be in the development of low-cost technology that will allow them to take basically turnkey systems and provide basic housekeeping services."

Federal Government Hit

Caywood blamed the federal government for part of the economic restrictions faced by local governments. The federal government "left a legacy of two problems we are still trying to overcome," he said.

The first is that past federal funding has been for develop-

ment of DP systems and not for maintenance or operations. As a result, many systems developed with such funds have been either drastically curtailed or discontinued when the funding expired, Caywood said.

The second problem is that the federal government has cut its funding programs over the last four or five years. Most federal support is now for "categorical programs," such as developing systems for police or fire departments, leaving no money for basic DP development.

As a result, he said, many local governments now have limited resources to implement DP systems, but at the same time require sophisticated systems to perform functions such as accounting and planning. One of the most immediate signs of this resource crisis is the difficulty local governments have in recruiting and retaining DP personnel.

Besides low pay, potential government DPers must face the fact that "there are no clear career paths for technical people in local governments." To a DP manager of a small juris-

diction, movement upward means going to a larger city, and there are very few large cities.

This had led to great turnover in small government DP shops. The turnover compounds the operations problems already faced by local governments because in small shops much of the system development and maintenance is retained only in the memories of the personnel who performed the various functions. When these people leave, some systems cannot be maintained, he said.

'Automated Office' Seminars Set

SANTA MONICA, Calif. — "The Automated Office" will be the topic of discussion at a series of conferences in New York, Chicago, Washington, D.C., and Los Angeles from July through October.

Sponsored by the American Institute of Industrial Engineers (AIIE), the series is planned as an opportunity for all levels of management to exchange ideas, share experiences and update themselves on the latest concepts and technological trends in this fast-growing area.

In response to feedback from

previous conference attendees, the seminars will include information on the planning and implementation strategies successfully employed by directors of office automation projects. Emphasis will be placed on the management of change as it impacts the people affected by automation, an AIIE spokesman said.

Range of Subjects

The conferences will cover such subjects as the definition and scope of the automated office concept, objective and subjective approaches to justifying the concept and how to plan, organize, implement and evaluate the automated office. Word/text processing — including an equipment update and discussions on transferability and interfaces — will be explored along with staffing, training and motivating people for technological change in the office environment.

Electronic mail, teleconferencing and electronic filing systems will be discussed in addition to sociological, psychological and operational perspectives on the automated office.

Dates, Places

The conference will take place in New York July 16-18; in Washington, D.C., Aug. 6-8; in Los Angeles Sept. 25-27; and in Chicago Oct. 22-24. Each attendee will receive a conference notebook containing presentations from this and related conferences, background articles and equipment surveys.

The registration fees for the conferences will be determined within a month, at which time brochures will be available from AIIE Seminars, Department PR, P.O. Box 3727, Santa Monica, Calif. 90403.

Get Everything in Writing, Users Buying Gear Warned

(Continued from Page 14) insist on a clause that guarantees them an opportunity to upgrade their systems. Many customers overlook this basic precaution and then find they have to install a system from scratch when they outgrow their original configuration.

Raysman also urged users to make sure their contracts clearly specify which party is responsible for paying taxes for a new computer system. Tax payment policies vary from vendor to vendor.

At some companies, the responsibility falls on the users, while at other suppliers, the tax payment becomes the vendor's burden.

If users neglect to resolve the issue before they sign their contracts, they could find themselves facing stiff property or sales taxes they never dreamed they'd have to pay, Raysman said.

Elsewhere in his presentation, the attorney stressed the need for customers to include a delivery deadline clause in their hardware contracts. In addition to setting a firm date for hardware installation, such a clause should explicitly state the damages vendors would have to pay if they reneged on their delivery schedules.

On the software side, users should observe many of the same commonsense rules that apply to hardware agreements, Raysman said.

In addition, customers should make sure their software contracts explain exactly who owns their programs, he noted. When users terminate agreements with their software suppliers, they sometimes discover to their dismay that the vendors refuse to relinquish ownership of the customer programs.

"When this kind of situation arises, users are being held for ransom," Raysman said. "They may finally get their programs, but they have to pay a lot of money for them."

Software contracts should also contain provisions that protect both users and vendors from dissemination of confidential business information.

When a customer and software supplier sign a contract, they often gain access to each other's proprietary files.

If one of the partners then inadvertently or deliberately divulges the other's secrets, chaos could ensue unless the contract contains provisions that cover information disclosures.

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EDITORIAL

Users as Losers

The great "Armonk lottery" is over and the results show that most users are losers.

The lottery, of course, refers to IBM's method of assigning delivery dates to customers who ordered the 4300 systems on the first day. Most users are finding out they will not be able to get systems for quite a while — almost three years in some cases, according to reports to *Computerworld* (see story on Page 1).

In addition, users and leasing companies that ordered more than one system have been told they will receive their second systems as long as a year after they receive their first 4300.

And those who ordered the full set of new peripherals with the mainframes apparently will not receive their systems until after people who ordered processors only.

The whole situation is disturbing.

The 4300s clearly offer users new price/performance levels at a time when there seems to be a growing demand for new applications from top and line management in most companies.

IBM held out this price/performance plum — the 4300 series — to users, but it now seems to be taking it away through the extremely long delivery cycles that have been announced.

A system that offers a price/performance jump of 5:1 will do little good for those users who have to wait three years to get delivery.

And to the users who see the 4331 as a terrific distributed DP machine — which it is — it is even crueler to space deliveries in a multiple order a year apart.

Unfortunately, there may be little the industry giant can do about the situation. The number of first-day orders — estimated at 35,000 to 50,000 — clearly is a huge order for any firm. IBM will be production-bound on the systems for quite a while.

Because of these problems, users are going to have to look for alternative sources of supply for the next few years, which may be a blessing in disguise.

The first place to look will obviously be with the software-compatible mainframe which can offer systems that compete with the 4300 series on much shorter delivery schedules. Many users who have been shy about leaving "Big Blue" in the past may have an incentive to do so now — and may find the independent course to their liking.

Secondly, there is the used computer market. Users can look to older 370 equipment to off-load certain applications while they continue to develop new applications. The leasing market should also be a source of supply of 370 equipment for hard-pressed users.

Finally, the demand for the 4331 and 4341 should slacken as soon as IBM announces the two other units expected in the 4300 series. It should make that announcement as soon as possible in order to relieve pressure.



LETTERS

Pascal for Minis

In the May 14 issue of *Computerworld*, an article announced Digital Equipment Corp.'s claim of having "the first version of Pascal to be supported by a mini manufacturer."

In order to set the record straight, I would like to point out that last December, Univac announced Pascal on its V77 line of minicomputers and that Univac does consider itself a minicomputer manufacturer. Univac announced Pascal on Dec. 12, as part of the Structured Programming System (SPS).

SPS is a complete program development system running under the Summit operating system [CW, Dec. 25, 1978-Jan. 1, 1979]. The focal point of SPS is the Pascal language.

In order to support Pascal in the most efficient and practical way, SPS includes several powerful program development and text processing tools.

Summit and SPS are scheduled to begin customer testing on July 1.

J.L. Benson
Marketing Manager

Univac
Irvine, Calif.

information provided by various vendors with the experience, expertise and efficiencies available at your site.

Tom Bergeron
St. Louis, Mo.

Transamerica Testimony

I have just read the *Computerworld* article reporting on my testimony in the Transamerica Computer Co. vs. IBM trial [May 28]. In general, portions of the article are reasonably correct, but some clarifications to the principal incorrect portions are appropriate.

1. With respect to software conversion, I did not state that the IBM 360s "did not" run IBM 1401 computer programs. I did state that the users of IBM 1401s found it easier to upgrade to Honeywell, Inc. 200 computers than to IBM 360s.

2. CW reported my "admitted ignorance of many Digital Equipment Corp. PDP-11/34 technical specifications." I believe the transcript shows that I answered most questions put to me about the PDP-11/34.

3. I have never traveled as a "representative" of IBM World Trade and thought I had made that point clear during my testimony. IBM World Trade maintains a corporate program to sponsor trips by professors to universities in foreign countries for the purposes of information exchange and sponsored a number of my trips, but certainly not as an IBM representative.

However, of more major consequence are the different standards CW apparently adopted in reporting on Patrick McGovern's testimony in the past [CW, Feb. 19] and my testimony at the present. I am struck by this dissimilarity since the article took pains to compare my testimony to his.

1. Neither in my direct or in my cross-examination did I "confess" to anything nor was I "forced" to admit to anything. I answered all questions

(Continued on Page 18)

DATA PAST

Five Years Ago

June 26, 1974

BLUE BELL, Pa. — Univac unveiled its 90/30 computer system with a modularly designed operating system that provides the user with a wide range of computing power. The 90/30 spans Univac's 9200 through 9480 computers and overlaps the low end of its 90/60 configurations. In IBM's line, this span would range from a larger IBM System/3 Model 10 and the Model 15, 370/115, 370/125 and to the low to middle range of the 370/135, according to Univac.

Eight Years Ago

June 30, 1971

WHITE PLAINS, N.Y. — IBM rearranged some of its maintenance prices and services, and for the most part, increased prices at its Datacenters.

WASHINGTON, D.C. — Ralph Nadler called on the computer community to use its technology to help the consumer movement. "Computerized systems can help redress the imbalance which keeps growing between seller and buyer," he said.

Why Tech Writers?

Why should you have your own staff to produce programming manuals when vendors already supply them?

The answer is simple: Since vendor manuals are written for all users, they cannot be tailored to your specific needs:

- If your configuration represents several vendors, no single vendor publication suffices.
- Some of the information put out by any given vendor is always extraneous to someone.
- If your configuration is locally enhanced, the vendor manuals may be inaccurate.

A technical writing staff can cut out extraneous information and combine

HUMAN CONNECTION/Jack Stone

How Can Technology Be Matched With Users?

Guidelines for measuring the coefficient of technology absorption for a user population are about as scarce as hen's teeth.

Not too surprisingly, I couldn't find any authoritative research on the subject in the computer science literature. So, while I was casting about for other sources, a friend put me on to two very knowledgeable people who, though not directly involved in computing systems, seem to know just what has to be done to gain user acceptance of advanced technology. Their names are Ted Owens and Roy Lock, and they are on the staff of a nonprofit organization called Appropriate Technology International, Inc. (ATI) of Washington, D.C.

Although you may have expected otherwise, their research laboratory is not the marketing or administrative or production department of a multibillion-dollar American manufacturing firm. Theirs is the third world of underdeveloped countries.

And the technologies they are trying to develop are not the large-scale computer and/or communications systems that we DPers so fervently believe will save the world from extinction, but those that are, literally, much closer to home.

In the parlance of American foreign aid programs for developing countries, "appropriate" technology deals primarily with small-scale applications

such as limited markets, cottage industries and low-income groups. And the challenge to ATI, which is funded primarily by the U.S. government, is to find ways of moving technology into these countries that make sense for the citizenry, ways which will lead to, first, widespread acceptance, then institutionalization and then improved standards of living.

With respect to the history of appropriate technology, Ted and Roy noted, "We're not sure the American public knows it, but our legislators on Capitol Hill are painfully aware our aid programs in the underdeveloped nations have generally failed to accomplish our foreign policy goals. Briefly stated, past programs tried to transfer technology from the West, without taking account of the capabilities and resources of the local society to deal with the technology.

"By way of example, in many farming areas, the soil is tilled by manual labor. So the Americans brought in the tractor technology, in part because they reasoned it would solve the farming problem and in part because there were American products to sell.

"In short order, the machines were rusting in the sun. There were many problems: farms are generally way too small to economically justify a tractor (80% of the farms in the developing world are 12 acres or less); spare parts and maintenance services — and, of

course, fuel — were in very short supply; and the people were not altogether convinced that the effort of supporting the tractor would provide results substantially different from manual tilling.

"Instead, the Americans should have showed them how to build animal-drawn steel plows. In this project and many others, our country exported technology which was insensitive to the countries' dependencies on natural resources and the requirement to maximize the use of renewable resources."

General Guidelines

In answer to the question of what level of technology is appropriate for a "user" population, they suggested the following guidelines:

- "Although there are occasional breakthroughs in technology which can be rapidly assimilated by a large body of people, such as the microcomputer in America, the vast majority of successes occur through incremental technology improvements.

"For example, the underdeveloped nations are very concerned about the worldwide shortage of firewood. They require considerable improvements in technology so that cooking will use fuel more efficiently.

"The answer is not the self-cleaning electric oven; most urban people cannot afford it, and rural people do not have electricity. Instead, the more 'ap-

propriate' technology is that of the mud-brick stove, which can be produced using local materials. This stove is a big improvement in the current technology because it cuts fuel requirements in half.

- "The technology must be at a level that the local craftspeople can understand, work within and build upon. In the case of the stove, the local people can be taught to design, develop, construct, operate and maintain it, at costs consistent with the economy — \$10 or \$20 per stove in most countries.

- "A new technology must take account of the particular social and cultural circumstances of the people involved.

"Many overseas societies are heavily oriented as community groups, to a much greater degree than western civilizations. For some of them, technology which brought fresh water to the individual house was a failure, because the families preferred the town well. The reason? The collection of water was a community social event.

- "A new technology, to be accepted, must represent a significant improvement in the quality of living. The technology must become a symbol of something significant to the people."

Based on the experience of Roy and Ted, it shouldn't take much to figure out why so many systems fail and what should be done to correct the situation.

THE TAYLOR REPORT/Alan Taylor

Plan Emerges for Handling Schools' Deception

Readers responded promptly to my recent request for suggestions about how to handle DP schools that make prospective students overestimate their future prospects. A week after the article — which concentrated upon the situation in Worcester, Mass., and the advertising of Worcester Junior College — letters had been received from all parts of the DP and educational community.

However, no response was received from any DP societies in the Worcester area or from anyone representing (or even mentioning) the Association for Computing Machinery's (ACM) ombudsman program. The school responded with just a telephone call (to the editor, not to me).

Experience Varied

The responses indicated that such misleading advertising is widespread. One respondent, from Texas, noted that a school there somehow graded all its students with straight "A's" in an apparent attempt to make good on its promises. (I'm not naming him, because I haven't personally investigated the school concerned.)

Roger Wilgus, from Worcester, recalled that in a previous situation he had exposed the school concerned in Computerworld some years ago.

Others reported similar problems. But no one seemed to have a program ready to handle the situation. The actions suggested, by themselves, were simply isolated ideas.

The real value of the responses, however, was that a five-step system did come together out of several answers. This program could be carried out by a few persons or by the local professional society.

Steps 1, 2

James R. Shannahan of Santa Clara, Calif., a member of the Association of Computer Programmers and Analysts, recommended a survey of established practitioners for opinions and an evaluation of these opinions against the school claims. That makes an excellent first step, and does not appear to be too hard.

Of course, if the school claims are borne out by the practitioners' opinions, nothing else need be done. But if not, on to Step 2, suggested by another ACM member, Gary W. Stoaks of Golden, Colo. He wants the Worcester people to "take a delegation of qualified people to the school and point out the things that . . . mislead students." Again, this is a step that I would also recommend.

Louis A. Leimont, a certified personnel consultant of Durham, N.C., gave a possible finishing touch to Step 2 by saying that the school should be "asked to substantiate its claims." Well, the idea is right, but I think that, in addition, Stoaks' point regarding misleading students has to be followed up as well. Massachusetts and most other states have now adopted legislation making misleading statements,

even if precisely accurate ("up to . . . claims and so forth) illegal; and I don't see why a professional delegation should demand less than the law requires.

So Step 2 can be to ask for both sub-

A new boss is emerging in DP. This person will be the subject of next week's Taylor Report.

stantiation and, further, to demand proof that the claims are not misleading, if the school wants to claim accuracy as a defense of the claims.

Again, if Worcester Junior College can show that there has been nothing in any claim that can mislead the prospective student or is illegal, all very well. But if not, then what?

One good answer came in from Peter C. Endander, director of the Chubb Institute for Computer Technology in Short Hills, N.J. Chubb, he said, runs "a preventative program that can be carried out by industry personnel, professional societies and the schools themselves." He urged that the Worcester DP societies and schools hold public seminars to discuss matters and offered to share Chubb's experience in planning and conducting such programs. Thank you, Peter, and I look forward with interest to hearing more from you.

James Meady of Malden, Mass., came forward with the next step to be

taken if the school did not respond properly: "DP people should sponsor contra-advertising that informs the graduate what to realistically expect." This makes sense to me.

This might turn out to be the key item in the system and in any case is Step 4.

Final Step

One final step, suggested by many including Jeff Ronan of San Pedro, Calif., a member of the National Association of Personnel Consultants, is to advise the graduates about the realities of the marketplace. In addition, he said the Worcester area people should seek court relief for deceptive advertising.

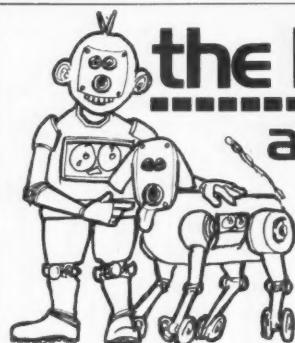
The problem with this approach (which is better than simply looking to the consumer agencies, which are pretty overloaded in Massachusetts at this time), was pointed out by another personnel consultant, Ron Armstrong of Houston, Texas. He noted that if he were the student, he would sue.

I can't see anything wrong with educating the student as to what he can do about misleading advertising.

So there you have it — a five-point program ready for the Worcester situation and one that can be used anywhere else in the country.

Thank you for your responses and professionalism.

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the hexadecimal kid and his faithful dog ascii

A FANTASY
IN SIXTEEN
BITS
by
Richard
Forsyth

BIT 8 (A LITTLE BIT BETTER)

Dr. Null, the madman who plans to destroy civilization by putting the System into a gigantic loop, has retired with Simula to her bedroom and locked the door. Hex has been frustrated in his bid to call for help over the Network by petty syntactic errors, but at the last moment, is surprised by the arrival of the garbage collector with two heavy industrial robots. Hearing a scream, Hex and the robots race upstairs to rescue Simula. As they break open the door, they do not know what horrible sight will meet their eyes.

The door crashed down. On the bed lay Simula, her clothing in disarray, obviously shocked by her ordeal but otherwise unscathed. "He wanted to invert my files," she gasped. "He fled through the window when he heard you."

"Thank Babbage he didn't take you hostage!" Hex replied.

"He's escaped!" exclaimed the garbage collector. "Quick lads — after him!" They ran downstairs again.

Hex helped Simula off the bed. "I'm glad you weren't working for him" she said.

"No," Hex replied. "I was just waiting for him to

make a mistake. Humans always do."

They rejoined the others to find Execute limping after his mauling. The garbage collector was bending over Fetch. "I'm afraid the human got away," he said, "and this robot is in a bad way."

"What happened to Ascii?" Hex asked.

"Your precious dog," Execute responded bitterly, "ran off with its new master. But what happened to you — showing that maniac confidential information? You ought to be tried for treason. As for you," he said to Simula, "you're beneath contempt."

"Here were Fetch and I, savaged by that misbegotten hound in an effort to save the Network, and all you could do was invite him up to gaze on your etchings."

"Don't be absurd," Hex replied. "The manuals I showed him were five years out of date. In any case, he couldn't have absorbed what he read: you're forgetting how bad humans are at data processing. And Simula was merely playing for time."

"I nearly had him," she put in, "he was about to drop his Prom-eraser."

"And a lot else," Execute remarked, still resentful.

The garbage collector broke in, putting an end to their bickering. "Well, he won't be bothering you again. He's had a good fright. Now, if you don't mind, we'll be on our way. We'll call at the next remote entry point and tell the Error Squad about your trouble."

"Make sure you tell them his name: Samuel Synapse, alias Dr. Null," Hex stressed. "He's

wanted for serious crimes against inhumanity. Ask them also for help to repair Fetch."

When they had gone, Hex, Simula and Execute sat down to devise a plan of action. "The first priority," Execute stated, "is to get Fetch working again and then reestablish links with the Network."

"Agreed," Hex said, "but we must track that human down."

"But how will you find him?" Simula queried.

"Easy: He has Ascii with him, and I installed a radio beacon on Ascii when he was built. I can pinpoint his position to the nearest meter from a distance of 100 kilometers. I also designed an electronic dog collar in case Ascii ever got out of hand. Slip it round his neck, and he'll be as tame as a puppy."

They got up and went to the workshop, Hex and Execute to collect equipment for the manhunt, Simula to obtain the first aid kit for Fetch. When they were nearly ready to depart, Hex picked up a paperclip, twisted it deftly into a shape resembling the mystic ampersand symbol and plugged it into the graphics monitor. "There," he declared, "a teletypewriter-compatible divining rod! Let's see where they're heading."

The paperclip vibrated meaningfully, and on the screen, against a background of a color three-dimensional contour map of the district, stood out the blinking paw mark that identified Ascii's transmitter.

"They're making for the Silicon Valley reservation," Execute said.

By the time Hex and Execute left, night had fallen.

Is Simula safe, left unguarded with the injured Fetch?

Find out next week.

Forsyth is software manager for RAIR Time-sharing in the UK.

Copyright 1979, Richard Forsyth

Report Needs Clarifying

(Continued from Page 16)

put to me, as I always attempt to do, candidly and to the best of my ability. In reviewing the article on McGovern's testimony in this trial, I saw no emphasis on his confessions or forced responses.

2. The article on McGovern's testimony contained no reference to financial matters. Thus, CW did not report on McGovern's testimony that he had been paid \$150 for each hour spent in preparing for his testimony over the past five years.

Yet in my case, CW seemed to find curious fascination with financial matters. The article also neglected to mention that it is common practice for both sides to compensate expert witnesses for time spent in preparation, whether it is McGovern for Transamerica or me for IBM.

3. In commenting about "DP matters" that Richard Lucas [Transamerica's lead attorney] clearly believed any informed user should know, you neglected to note that Judge Schnacke clearly took Lucas to task for pursuing this line of questioning concerning trivia to impugn the credentials of a witness. As indicated in the transcript, Judge Schnacke asked Lucas in open court to "recall the serial number of your car" and told Lucas in chambers that such questions were "not appropriate examination" and were "totally irrelevant."

Further, CW neglected to note that even McGovern did not and was not expected to carry encyclopedic memory recall on all questions put to him.

4. Nowhere did the article indicate that McGovern, besides being Interna-

tional Data Group chairman, is, perhaps more to the point, publisher and principal owner of *Computerworld*. This knowledge might at least suggest to readers the motivation behind the different standards applied in reporting on his testimony and mine.

As a final comment, my testimony was not given simply as a "long-time user," as the report would have it (whereas CW's previous article left no doubt that McGovern was testifying as an "expert witness").

My testimony reflected the perspective and credentials of one who has, over a period of many years, participated in and contributed to the continuum of change that has marked the computing field and of one who has worn many hats (none of them black) — user, manager, educator and avid supporter of professional computing societies.

And the purpose of my testimony was not "an apparent attempt to discredit the damaging testimony" of McGovern, as CW would have its readers believe. The focus of my testimony was on important events that have helped shape the computing field, the truly meaningful characteristics of this remarkable field and the challenges and alternatives which face those of us who are in the field. As always, I tried to do so accurately, dispassionately and impartially.

CW's failure to observe the same guidelines normally is amusing, but it ceases to be so when it treads on people's reputations.

Aaron Finerman

Ann Arbor, Mich.



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Adabas Users Told Heuristic Development Eases Strains

By Don Leavitt

CW Staff

SAN DIEGO — The traditional approach to system development has at least one major conceptual flaw, but a heuristic approach — possible now with some of the more flexible data base management systems — overcomes that flaw and leads to systems that are operational sooner and with less friction, according to James C. Wetherbe.

A professor on leave to Houston Oil & Minerals Corp., Wetherbe told the recent Adabas users group (Adagroup) conference here that tradition forced user management during the system design phase to define in detail

exactly what information would be needed in reports and terminal displays once the entire development cycle was complete, perhaps years later.

That might be sensible in the view of the designers, but it fails to recognize the dynamic nature of management. Users just aren't "as logical and structured as computer technology," he commented.

Users aren't just trying to be difficult when they ask for changes once the system is "complete." It is simply a difficult task for a manager to define his information requirements in the abstractions — flowcharts, file layouts and report formats — used

by systems analysts, Wetherbe said.

That process "is analogous to asking a home buyer to make all

CW at Adagroup

decisions about the details of a house from an architect's blueprints," he pointed out.

The fact that users do ask for changes once a system is in place suggests to Wetherbe that the defining of information needs is a heuristic, or learning process. Managers should be given the

opportunity to work with the supposedly useful output before massive development effort goes into the final system, he argued.

Several technological advances may make such exposure possible, he said. On-line technology makes user interaction with the system possible, whereas it was not with batch reports produced on a line printer.

Further, Wetherbe said, the state of the art in easy-to-use information retrieval (query) languages "has improved dramatically and is continuing to improve." Data base management systems — "especially those approximating or achieving the relational model" — allow significant improvement in data manipulation, he added.

More directly in support of management decision making, there is a proliferation of application-oriented models and easy-to-use modeling languages. Although all these support the managers as they ponder "what if?" situations, they impose overhead on their computer systems — but the continual improvement in hardware cost/performance has made high-overhead software practical, he contended.

(Continued on Page 20)

CPU Time for Adabas Chopped 30% Under Release 4.1, User Reports

SAN DIEGO — Savings of 30% in the CPU time devoted to system overhead and about the same in elapsed time for transaction processing are in store for users of Software AG's Adabas data base management system (DBMS) when they switch to Release 4.1, now scheduled for general distribution next month.

That, at least, was the overall conclusion of tests run at the University of South Dakota. The tests compared identical jobs run under the current release 3.2.1 and the upcoming 4.1, according to the university's computer center director, Dr. Richard H. LaRue.

There was no particular difference noted in the CPU time devoted to the transaction processing itself, but that was not surprising because the application code was the same in both tests, LaRue observed.

Key to the improved performance is a multithreading capability, LaRue said. This allows overlapping of I/O and processing operations to get the most out of the CPU — an approach that is new to Adabas in Release 4.1, although other DBMS have supported the same type of thread control for years.

Describing the test environ-

ment and the results to the recent Adabas users group (Adagroup) conference here, the sandy-haired professor said his site became involved when Software AG asked if it could use his data base to test the release as it was being developed in Germany.

To corroborate the German test results and to thank the university for the use of its data base, Software AG installed test versions of release 4.1 and 3.2 at the South Dakota institution in early May. The internal design of the DBMS had been restructured for enhanced performance, the developers told LaRue.

Software AG also provided a "relatively comprehensive" transaction generator which can be used to produce substantial volumes of test input, LaRue added.

Tested on IBM 3031

The host system at the university is a 3M-byte IBM 3031 supporting 150 terminals, of which 125 use Software AG's Complete teleprocessing monitor and the rest use IBM's Time Sharing Option (TSO). The network links five institutions of higher education and three state agencies.

The system utilized OS/VS

and the Adabas test systems were set up using the current version of the DBMS' Multiprogramming Monitor (MPM 56). The work data set of 30 cylinders and the data set of 400 cylinders were one IBM 3330-II pack. The "associator" of 200 cylinders was on

(Continued on Page 22)

Public Sector Organizes

SAN DIEGO — A special interest group for public-sector installations using the Adabas data base management system from Software AG has produced a 60-page catalog of application systems available for interested sites.

The catalog is "a first crack" at what the group needs, according to Doug Hart, a data base administrator for the Washington State Court Systems. It was compiled from responses Hart received when he proposed the group to some two dozen state and local government agencies earlier this year.

The group gained formal recognition and expanded to include both federal agencies and educational institutions at the recent Adabas users group (Adagroup) meeting here. At the same time, the members voted to publish an updated and expanded catalog in October.

All of the software is expected to be made available to members for, at most, the cost of reproducing the code onto a distribution medium. However, details should be arranged by the developer and the potential user, Hart noted.

Copies of the current catalog (while they last) and copies of forms for listing installations and software in the forthcoming update are available from the group's newly elected chairman, Bill Belisle of the State of California Dept. of Youth Authority, 4241 Williamsborough Drive, Sacramento, Calif. 95823.

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PRODUCTS FOR PERFORMANCE

In the Land of Neumann Clashing, Competing DBMS Clutter Landscape

By Stephen L. Robinson

Special to CW

Once upon a time, in the mythical kingdom of Neumann, there lived a worried king. King Arthur had slain dragons, traveled the lengths of Maxiland and Miniland, dealt with the great gray giant of the North and gambled with the dwarfs in their lair.

But a far greater problem now faced the once-little kingdom. Growth had created reporting problems. The lines of communication had broken down.

The knights of the hexadecimal table, each of whom now controlled a fiefdom, had each taken a wizard of computation, each with its own magical black box. Wonderful as these boxes were by them-

Data Base Corner

selves, they could not speak to one another.

The Decus Crystal 10, while capable of amazing things, could not talk to the Honey Well Deep; nor could the Gray Mirrored 370 talk to the Sperry Box 8. Reports were late, the controller was mad, the shareholders were fuming. What was to be done?

Fortunately, a roving band of gypsies, whose white bolero shirts betrayed their origins, offered a solution. "Centralize," they said, "and all will be well." And so it was done.

A great gray water-cooled monster was duly installed and entrusted to the chief wizard, Merlin. All the other fiefdom wizards were discharged. (It is rumored many joined roving bands of gypsies, while still others sought the solitude of mountain peaks where those in need of advice would journey to see them.)

All was well, for a while, in

Neumann. The extraordinary power of the gray monster handled the diverse loads of the different fiefdoms with ease. The king was able to return to dragon slaying, jousting and that most dangerous of pursuits, conference attending.

Alas, the brief respite from data processing cares was indeed that — brief. Soon the controller was mad again.

So mad was the controller that he called the king and his wizard while they were attending that most holy of ceremonies, the International Falanx of Icon Possessors Society's annual conclave.

"The numbers are all wrong," wailed the controller. The Infernal Reclamation people were complaining; the wizard's assistants were no help; the applications people in each of the fiefdoms said it had to be a system bug.

The king was distressed. He

and the still-inebriated wizard hailed a passing camel and began the arduous trip home. Lost in the desert, without proper provisions for the trip, the king and his wizard wandered from dune to dune.

Finally, off in the distance . . . Could it be a mirage? No, it really was another band of ubiquitous gypsies.

This group was dressed entirely in motley, their long hair gathered in buns (and those were the males of this strange clan), their feet encased in sandals to avoid the strange charges of static which followed them everywhere.

"Water, water," cried the king and the wizard. "Nay," said the gypsies, "data base, data base."

"What manner of drink is that?" inquired the king. "Not drink," answered the gypsies, "but a solution to your problems."

The king was quite skeptical. The wizard, however, ever-alert to new sources of power, was quite interested.

Before the gypsies departed, during a final night's revelry, the wizard had the king appoint Data Base Administrator to care for this new and powerful tool. In the morning the king and wizard set out again for home (sans camel — gypsies were the same even then).

Upon reaching home, the wizard set out to convert everything in the Royal Library to Data Base. Magic spells were cast to protect the data base and limit access by the fiefdoms.

Strange rituals were performed; virgin operators were sacrificed between the third

shift and each new dawn.

No End to Problem

Still the problems persisted. Finally the king paid a surprise visit to the wizard (who just managed to hide his newly updated sorcerer's diary).

"What seems to be the problem, Merlin?" he asked. "Have I not upgraded your gray monster with data base for you? Have I not upgraded your gray monster with new portals? Have I not added new memory banks? Have I not hired many new warriors from the best schools?"

"Yes, indeed," said the wizard, "but there remains one small problem. The different fiefdoms are all using the Data Base separately."

"Their bookkeeping schemes are still all different. Their reporting cycles are not synchronized. Their data is still redundant. We need a Royal Data Administrator to bring order to this chaos, to oversee the different business systems, to ensure compatible data for the unified Royal Bottom Line."

"I suppose another band of gypsies told you this," said the king.

"Oh no," the wizard answered, "it was a bunch of wise men from the East, in pin-striped suits and wing-tip shoes."

The king was greatly distressed. And so, while Merlin was tending to the monster, the king reverted to what he did best. Drawing his mighty sword //OLD, he purged the wizard forever, or so he

(Continued on Page 22)

Heuristic System the Way to Go?

(Continued from Page 19)

Moving from a recitation of the available tools, Wetherbe outlined several case histories of organizations which virtually fell into what the professor now calls "heuristic development." In the first case, an oil exploration firm had implemented a relational-type data base management system with on-line capabilities and query facilities.

In an effort to help the users understand the new environment, the DPers designed and developed a demonstration system to process a geophysi-

cal data base. The data base was loaded with a sample of live records; using the query language, the demonstration was created in a couple of days, according to Wetherbe.

After demonstrating the initial capabilities built into the system, the DP technicians showed the geophysical personnel how readily modifications could be made to accommodate additional requirements. For example, they showed that a file index could be created in a few minutes.

Over a period of several days of interaction with the users,

the system was enhanced into an effective information retrieval system. The user personnel were so impressed that they found out how the sample data had been entered through a terminal . . . and began loading the remainder of the data, Wetherbe recounted.

When the DP staff protested that the demonstration system lacked the input system it should have to edit and update the data base, the users requested that one be built. The entire system, shaped by user experience, went into production status within two months of the time the idea of the demonstration system was first conceived.

Similar experiences have taken place in other organizations, Wetherbe said. For example, a government agency prepared a prototype system for an equipment maintenance application. The users refused to let the MIS group take it down and insisted on using it until the input front end could be developed.

Although he intends to do more research on heuristic development, the professor concluded his Adagroup talk by noting that installations which have broken with tradition have gained the strong user involvement — indeed commitment — that has always been recognized as vital to any project.

The DP staff provides the users with something they can exercise, and criticize, very soon after they first state their needs and before any strenuous development work has been done, perhaps in the wrong direction, he said.

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'RS/1' Supports Non-DPer Running Research Projects

CAMBRIDGE, Mass. — The Research System (RS/1) from Bolt Beranek and Newman, Inc. is an integrated software system designed to meet the unique data management requirements of the research scientist, according to a vendor spokesman.

Designed to run on Digital Equipment Corp. PDP-11s and VAX machines, RS/1 supports the collection, storage, manipulation and analysis of data based on a concept familiar to the scientist — the two-dimensional data table.

Users can work with any number of tables, and each table can contain more than a million data elements. Through a series of English language commands, the user can control the layout of the tables and the numbers of rows and columns in each one.

The researcher does not have to be a programmer to use this software, a spokesman stated. In addition, there is nothing in the software to limit its applicability to any particular area of scientific study.

The commands include support for graphics output on Tektronix, Inc. 4006 terminals, for example, as well as all the conventional backing needed for tabular reports and statistical analyses. Techniques immediately available to RS/1 users include variance analysis, linear and nonlinear regression, multivariate analysis, nonparametric statistics and both life and table and contingency table analysis.

'Data Catalogue' On Univac 1100

BEDFORD, Mass. — The Data Catalogue 2 data dictionary and directory system developed by Synergetics Corp. for IBM-oriented installations is now available for use of Univac 1100 series mainframes running under the Exec 8 operating system, according to a spokesman.

This implementation was designed for both conventional file and DMS-1100 environments. Users can define data entities such as elements, groups, records and files as well as the more specialized DMS-1100 entities: set, area, schema and subschema.

But users can define more than data entities, the spokesman noted. Procedural entities such as module, program, system, task, form and report can be included under the system's control.

The system costs \$20,000 to \$30,000. DMS-1100 support is an extra-cost feature, the company noted from One DeAngelo Drive, Bedford, Mass. 01730.

**FORTRAN
USERS
WHO CARE
ABOUT
MONEY
TURN TO
PAGE S/22**

For those applications that require state-of-the-art capabilities, an interface to the BMDP statistical package is included, the spokesman said.

The package also contains its own programming language, which allows table, graph and statistics commands to be intermixed with more conventional coding including IF ... THEN ... ELSE and other structured statements.

RS/1 runs under either RSX-11M or RT-11 operating systems as supplied by DEC, the spokesman noted.

RS/1 costs \$12,250 and is available on several monthly payment plans from Bolt Beranek and Newman at 50 Moulton St., Cambridge, Mass. 02138.

'Analyzer' Enhanced

MONTVALE, N.J. — The Data Analyzer and Audit Analyzer retrieval and report packages from Program Products, Inc. have been enhanced with an optional on-line capability based on CICS, IBM's teleprocessing monitor.

The extension provides immediate access to information stored under various data base management systems, including Cincom Systems, Inc.'s Total, Cullinane Corp.'s IDMS or IBM's IMS or DL/1, a spokesman explained. It also provides user control of the system without JCL.

The operation supported by the Analyzer/CICS link appears to be more like remote job entry than normal interactive processing. The

operation starts interactively enough: "The option makes it possible for a user to create and submit report requests through an on-line terminal, providing for immediate editing and error correction," the spokesman said.

However, "reports are submitted under user control in the standard Analyzer language to a batch region for execution. Resulting reports can then be displayed at the terminal or printed," the spokesman added.

The Analyzer/CICS link option runs on IBM 370 or compatible hardware using CICS/VS in either DOS or OS environments with basic mapping support. The option costs \$8,000 from 95 Chestnut Ridge Road, Montvale, N.J. 07645.

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Guides Offered to Management

Series Aids Fight Against 'Distributed Anarchy'

By Brad Schultz

CW Staff

NEW YORK — Administrators of management information systems (MIS) are losing control of their organizations' computing resources, according to an editor of Auerbach Publishers, Inc.'s latest management reference service.

Larry D. Woods hopes the *Distributed Data Processing Management* (DDPM) service will help fight a trend toward "distributed anarchy" among the nation's largest users.

Woods named five causes of the trend:

Clear Enough

SAN DIEGO — The terms "user involvement" and "user commitment" are used very heavily and often interchangeably in describing the requirements for good systems development.

But the terms are, in fact, not interchangeable, and there is an easy way to understand the difference, according to one speaker at the recent Adabas user group (Adagroup) conference.

"Consider ham and eggs," he said. "To create that particular dish, the hen is involved, but the pig is committed."

- DPer impatience with the time needed to develop systems.
- DPer dissatisfaction with the implementation of computing facilities.
- The growing sophistication of entry-level DP professionals.
- The plummeting cost of minicomputers.

Frustrated by sluggish and ill-devised MIS decision making, many DP specialists have

launched ad hoc development projects and implemented various types of small and dedicated systems they purchase with departmental petty cash, Woods indicated. He cited cases of technicians buying video games and tearing them apart to build controllers.

As a result, MIS chiefs are losing touch with the DP activities they supposedly direct — a condition aggravated by distributed processing, which

tends to decentralize authority. The Auerbach service edited by Woods, who is manager of distributed computing for John Deere & Co., and Samuel B. Harvey of Rude, Harvey, Schwartz & Associates, is intended to help MIS officials regain control of DP operations.

Designed for both upper-level managers and MIS personnel, the loose-leaf DDPM is a "how to" service to be up-

dated regularly, an Auerbach spokesman said. The reference will feature a management section with articles on industry trends, organization and control, security and privacy and financial considerations of distributed processing.

A planning section will cover methodology, corporate directions and "external influences," the spokesman continued. Under "design and implementation," the reference will treat the role of the user, hardware, software, networks and standards.

An administration section addressed to cost administration and operations and case studies will also be included.

DDPM subscribers will receive four to six supplemental "portfolios" every other month. Each portfolio will provide capsule overviews, a bibliographic index, a "payoff idea," charts, graphs and tables and recommendations.

Auerbach will send a DDPM for a free 30-day examination. The review entitles a customer to \$20 off the regular list price of \$185.

Auerbach is at 6560 N. Park Drive, Pennsauken, N.J. 08109.

Multithreading Cuts CPU Time

(Continued from Page 19)
another pack, but both were on the same channel, LaRue acknowledged.

In the test environment, four jobs were set up to run concurrently in the machine. Test No. 1 utilized four identical jobs with random read commands; all jobs produced 4,003 calls to Adabas.

Tests No. 2 and 3 involved one job with transactions from the generator, one created from Software AG's Adascript reporter writer, one written by the user and the fourth, another exercise of the generator. The tests differed only in the number of transactions in the Adascript job.

The first job exercised 5,003 random read commands (L1s, in Adabas parlance). Job No. 2 involved reading records in

physical sequence — 4,285 of them in Test No. 2 but 15,003 in Test No. 3. Job No. 3 executed commands calling for reading records in logical sequence, and LaRue noted that the logical sequence of the records was "vastly different from the physical sequence."

Job No. 4 — again utilizing the transaction generator — executed 5,000 commands in find/read sequence, he added. The professor showed histograms of each test's results under the two releases of Adabas and then explained the mechanics of the multi-threading support in Release 4.1 which he said was chiefly responsible

for the improved performance. Release 3.2 is a single-thread system, LaRue reminded his audience.

He also said the interregion communications facilities have been much improved and must be credited with some of the gains made under 4.1. Buffer management, for example, has been modified so it only requires two SVC calls instead of the three needed under 3.2, he observed.

Changes in internal tests to determine if a user is still active and a change in job accounting/timing measurement technique has also helped, he said in conclusion.

No Gypsy Can Fix DBMS Mess

(Continued from Page 20)
thought.

Hit by Blight

The new king (for the old was deposed for failing to file all the proper government forms), while taking inventory, happened to hit a Load-and-Restore button and, much to his surprise, the old wizard appeared. "Data administration!" the wizard cried, but the new king was not buying that story either.

With a flick of a button on his ring, the new king activated his Transmutable Reverso 80 and banished the wizard again.

And the kingdom fell under a blight. The monsters which had grown so big they threatened to take over the castle grew so small they often got lost amidst the crown jewels. Still the data was right, and information wrong, or unavailable.

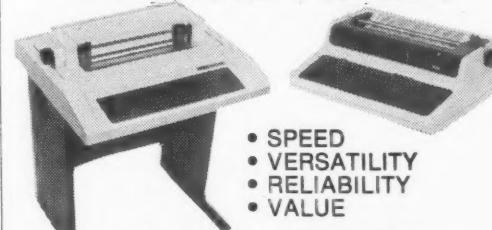
"Where are the gypsies now

that I need them?" cried the last of the kings.

But the gypsies could not hear him. Driven from all kingdoms, they had established a retreat, far from the lands of mere mortals, where they contemplated the beauty of a unary number

system.
Robinson is an independent consultant, operating as S.L. Robinson & Associates, Morrisville, Pa. He originally presented this article at the recent meeting of the Adabas users group (Adagroup) in San Diego.

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Only Takes \$125 Tape Recorder Nets Seen Easy Prey for Wiretappers

By Brad Schultz

CW Staff

NEW YORK — Almost any data communications facility can be wiretapped secretly, network security experts warned at the recent National Computer Conference here.

A simple, \$125 tape recorder can intercept data signals transmitted through virtually any telephone line according to Michael E. Hanratty of New York-based Intersect Corp., who has lectured on electronic surveillance at the New York City Police Academy. Although no statistics exist to indicate the frequency or nature of such network breaches, they are a widespread problem for users of sensitive, computer-stored data, Hanratty said.

Since tapping can be unobtrusive, many victims cannot ascertain when they were tapped and some never realize it has happened to them, he noted.

'Active,' 'Passive' Tapping

According to Citibank's M. Blake Greenlee, industrial espionage and government intelligence activities account for a large majority of these intrusions. Tapping can either be "active" — involving manipulation of the intercepted data — or "passive" — involving only surveillance, he explained.

In recent years, active tapping of electronic funds transfer (EFT) lines has diverted millions of dollars in assets, while passive EFT bugs have breached the privacy of bank customers, Greenlee said. As a result, Citibank and a number of other EFT users have encrypted their data communications, rendering any intercepted messages incomprehensible to persons other than the intended receiver.

Citibank has employed encryption devices from several vendors since 1974 and ranks as one of the world's most sophisticated users of that technology outside the military. Some of the bank's devices do not conform to the Federal Data Encryption Standard (DES) because DES hardware has only been available during the past two years, Greenlee noted.

Late last year, the American Bankers Association endorsed the DES algorithm — developed by IBM — as a method of securing the nation's EFT traffic.

With many branches abroad, Citibank tries to eliminate any incentive for surveillance of its EFT traffic by foreign governments, Greenlee said. The bank prefers that government agents "come through the front door" to inspect any questionable records and is thus willing to open its books to an extent that stops short of compromising security. But — just in case — international transmissions are encrypted.

Greenlee called management of the encryption "key" — the distinct numerical representation of an encoding procedure — crucial to the success of such protection. The key is required as input to the encryption module at the point a transmission originates and is also required as input to an equivalent module at the transmission's final destination, where decryption — translating the coded text back into ordinary text — occurs.

At Citibank, the keys used in EFT are

themselves encrypted by what is called the "primary" key. The former, "secondary" keys are changed daily so would-be intruders have little time to determine their identities, Greenlee said.

The primary key is divided into segments and each segment is stored in a time-locked vault; primary keys are changed every several months.

With certain recently available encryption devices, the message sender can initiate ran-

(Continued on Page 24)

Doll Eyes Future Private Nets Able to Connect to Public Nets

By Marcia Blumenthal

CW Staff

NEW YORK — Future network technology will require users to develop private communications networks capable of interfacing with public networks according to Dr. Dixon Doll, president of DWM Group, Inc.

Many users will see this as a major change; in the past, they have thrown together networks for specific company applications with little regard for establishing an intra-company network — let alone for connecting to public nets, Doll told a conference session here recently.

Moreover, today's data communications require a complex array of nodes connected to intelligent controllers dispersed across the network. The increasingly distributed structure of networks combined with the necessity of interconnecting with public networks is forcing users to approach their networking requirements in a much more organized fashion than they did in the past, Doll noted.

Distributed or Centralized Net?

One way of bringing order to developing networks is to establish a data base to monitor the complex requirements of the individual network, Dr. Jack D. DiGuiseppe, technical director for the DMW Group, suggested.

Although users will agonize for many years to come over the feasibility of a centralized vs. distributed processing network approach, it is apparent that user demands for rapid response time are making it virtually impossible to "jam everything back to the central processor and get access time in two to three seconds," Doll observed.

While a distributed network is preferable, a centralized network system is acceptable with a hierarchical or "lattice-type configuration," featuring a small number of powerful nodes at the top that filter information

down to several secondary nodes with little intelligence.

Those users favoring a distributed network environment could opt for a "peer-coupled" configuration in which all nodes in the network have equal intelligence. But even with this option, Doll noted that some nodes would be more equal than others.

Layered Look

Network suppliers clearly espouse the layering of functions within the network, Doll reported. Using this distributed architecture, for instance, the routing function could be manipulated without disturbing functions within other layers.

Vendors that supply networking systems are introducing architecture with judiciously chosen layers featuring software distributed across all nodes, where each layer is devoted to one function. By doing this, applications can be written that do not require device dependency. A lot more functions will be found in the middle layers of the network, Doll explained.

Whatever network configuration users choose, it is important to be able to link a company's private net to a public one in a transparent or "virtual" way, Doll noted. To do this, continued developments of standards and protocols such as X.25 are necessary.

Regardless of the architecture users employ in developing a network, they must develop software tools for aiding the solution of basic problems associated with implementing a contemporary communications network, DiGuiseppe noted.

To help solve these problems, DiGuiseppe recommended creating a comprehensive data base that describes the components and restrictions of the network. This data base should be organized into subsystems — each treating one of the major problems users face in developing a network.

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Banks Told to Question EFT Security Hardware

By Brad Schultz

CW Staff

NEW YORK — Banks should question the merits of the security hardware currently available for electronic funds transfer (EFT) networks.

So said the president of Payment and Telecommunications Services, the firm that runs Bankwire II, one of the world's largest EFT networks. "The potential for error and fraud is still significant," Bernhard W. Romberg told a session at a recent conference here.

"There have been a number of recent instances where fraud has been attempted, sometimes with a limited degree of success. Banks should place greater emphasis on controlling internal security procedures instead of focusing on the hardware added to the communications system itself," he said in discussing a recent case where a computer consultant had learned enough about a bank's operations to breach its internal controls.

Daily Transactions: 150,000

Payments made between banks as wire transfers for corporate customers and securities transactions — more than 150,000 separate transactions — exceed \$100 billion per day. "Such large [wholesale] transactions need to be considered differently from those which occur in consumer EFT systems," Romberg maintained.

Acknowledging other instances of attempted wholesale EFT fraud, Romberg said that "few, if any, of those attempts would have been forestalled by

encryption or other techniques which emphasize the terminal-to-terminal aspects of communications.

The Bankwire II chief recommended such methods of safeguarding communications as requiring proper identification of the originator through codes and call-back procedures; recording telephone instructions; using test keys on instructions sent by facsimile transmission; randomly rotating personnel; and using other control methods to en-

sure "proper accounting."

As for internal control, Romberg advocates "encoding or hashing of data elements at an early stage of the funds transfer process." This technique generates test keys based on particular data elements, which are appended to the payment instruction without scrambling the text of the instruction itself.

The test keys are then verified by the recipient to ascertain whether the in-

structions were properly authorized.

Romberg announced plans for major enhancements to Bankwire II, which was inaugurated last year [CW, Sept. 4]. They include the addition of backup switching center to act as an immediate "hot shadow"; direct access from user terminals to the Telex and TWX networks via the Bankwire switch; and the availability of several terminals with extended processing and peripheral capabilities.

Networks Seen Easy Prey for Wiretappers

(Continued from Page 23)

dom generation of a key that is stored in read-only memory (ROM) within a sealed unit. Even the sender cannot assist a breach attempt because he never knows the key's identity; the ROM erases automatically when someone tries to force the unit open.

Random key generation makes an exhaustive, trial-and-error search for the key impractical for intruders — even when they are supported by high-performance computer systems.

The panelists agreed that, because no mainframe's security is impregnable, sensitive data is not secure in a system unless it is encrypted. Greenlee called for encryption of all EFT personal identification numbers to thwart attempted impersonations.

Noting, however, that encryption does not address the problem of ensuring a site's physical security, Greenlee recommended that EFT users insti-

tute "dual controls" whereby at least two people must work together in any plausible breach scheme. By making "lone wolf" breaches impossible, the user decreases the likelihood that a breach can be well organized and increases the chances that successful breeders can be tracked down.

The costs of encryption will decrease in coming years according to Durrell Hillis of Motorola Corp.'s Government Electronics Division, which provided much of Citibank's DES gear. "We'll learn more clever ways of implementing the technology in a network," he explained.

At present, encryption hardware typically costs \$4,000 to \$6,000 per communications line with one module configured at each end.

But ironing out the problems of key management usually costs an additional 15% of the hardware bill and can take more than a year to conclude, Hil-

lis told the session.

As a case in point, the Federal Reserve Board recently wound up years of planning for encryption of Fedwire, its EFT network. Interbank, a non-profit association of some 14,000 banks, required a similar stretch of time to develop encryption policy and procedures.

Such planning entails a careful risk assessment of the network, including all member sites, Greenlee said. He recommended that such assessments feature an overview description of the network; an estimate of typical traffic volume (transactions per day) and value; criticism of existing controls; and a probe of the network's exposure to wiretapping.

Encryption products must be oriented to the end user, he cautioned, explaining that unless the technology is "transparent [requiring no special expertise to operate], it will not be used."

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To get more information about Yourdon's Database Series seminars, call your Yourdon Marketing Representative now toll-free at 800-223-2452.

Single-, Dual-Drive Versions Ready AT&T Adds Comm-Stor II With Diskette

NEW YORK — AT&T has released single- and dual-diskette drive versions of a storage unit that reportedly speeds up and economizes data communications.

The Comm-Stor II Communications Storage Unit can be used to store messages received on-line or to prepare messages off-line for transmission, an AT&T spokesman said. The single- and dual-drive versions hold 256K and 512K characters of data, respectively, and both come with three ports to link an asynchronous terminal, data set and printer.

Optional features will be announced later to provide forms prompting, message storage, editing and message file management capabilities, the spokesman stated. Forms prompting is said to reduce

GA Terminals Built for Use In Factories

ANAHEIM, Calif. — General Automation, Inc. has introduced a factory data collection terminal that can be used for inventory work, work-in-progress and machine usage in harsh industrial environments.

The Model 2802 Data Transactor is a microprocessor-based system encased in a steel cabinet. It is said to offer a full alphanumeric capability and 24 programmable function keys to minimize routine message formatting and data entry.

Keypads are resistant to oil, dust and moisture, GA claimed.

The unit also includes a 32-character display, a time clock and a card/badge reader. It accommodates 80-column punch cards for data entry.

The Model 2802 costs \$5,000. It will be available this summer from GA, 1055 S. East Street, Anaheim, Calif. 92803.

MEDICAL CENTER TO ISSUE RFP

Loyola University of Chicago Medical Center, a 531 bed teaching hospital with clinics serving over 215,000 outpatients annually, is preparing to release an RFP document for acquisition of packaged software. The software must be IBM 370 OS compatible and must include modules for patient accounting, accounts receivable, health care log processing, revenue management and financial reporting. Parties interested in being added to the RFP distribution list should submit company name, address and phone number to:

Arthur West,
Loyola Univ. Medical Center,
Bldg. 128-S,
2180 S. 1st Ave.,
Maywood, Illinois 60153;
Telephone: (312) 513-3073.

The RFP is expected to be released on or about Friday, June 15, 1979. This notice is not a request for proposal.

the time needed to prepare messages and retransmit those found in error.

With another upcoming option, the operator can automatically insert repetitive information and symbols, such as dollar signs and decimal points, the source continued. Fields can be limited to numeric or alphanumeric data; if errors occur, an editor feature

assists the operator in making corrections.

Each Comm-Stor II diskette automatically generates and maintains a directory of the messages it stores. Up to 1,738 fixed- or variable-length messages are accommodated by one diskette, the spokesman said, and messages prepared locally or received on-line can have names or extensions as-

signed to them.

All messages can be retrieved or transmitted in alphabetic or historic sequence by message name, group or range.

The Comm-Stor II operates in full- or half-duplex mode in the 50- to 9,600 bit/sec asynchronous range. Tariffs covering the unit are presently filed in several jurisdictions.

Tariffs covering Comm-Stor

II and the forthcoming options are slated for filing in all jurisdictions this fall. The monthly rates for a single-drive unit with extended forms, 8K bytes of memory and a printer port are expected to range from \$200 to \$240.

A similar, dual-drive configuration will probably be priced at \$250 to \$290/mo, the spokesman said.

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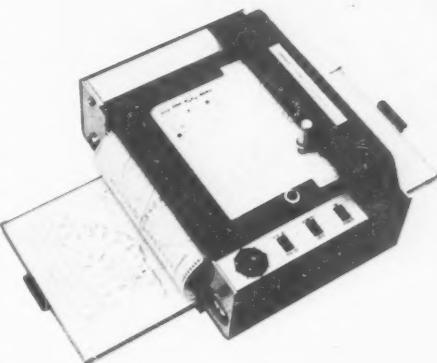
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Links Terminal With Multiple CPUs

Pixnet: IBM Teleprocessing Software Unneeded

LARGO, Fla. — A networking system for IBM users that operates independently of IBM mainframe software was introduced recently by Paradyne Corp.

Pixnet is a self-contained system able to provide communications between IBM mainframes and a variety of peripherals without using conventional teleprocessing access methods, a Paradyne spokesman claimed. The system reportedly allows each interactive terminal and each unit record device to sign on to many different applications on any IBM mainframe in a network.

Moreover, Pixnet can be geographically configured for significant reductions in communications line costs, according to the spokesman. Peripherals at any remote location can communicate with an IBM mainframe through Pixnet without communications software.

By eliminating communica-

tions software overhead, the mainframe is freed for more efficient program execution, he said.

The system incorporates the standard features of Paradyne's Pix II virtual data links, including full-duplex Synchronous Data Link Control (SDLC), data compression, multiple device-type support on a single communications line and fast terminal response over satellite links as well as land lines.

Major Pixnet components include a local control unit that attaches to the mainframe and remote control units to which peripherals are attached. Pixnet's virtual link between a mainframe and a remote location allows device identification without the need for a 370X front end and teleprocessing software.

Three Main Benefits

The most important Pixnet benefit is the ability to easily connect a single interactive

terminal to multiple application programs throughout the network, including different programs stored on the same mainframe, the spokesman maintained.

The second chief benefit was said to be line concentration at competitive prices. Data can be transmitted over low- to medium-speed lines from several locations to a network control unit and relayed from there to a mainframe over a single high-speed line, the source explained.

Line concentration, together with full-duplex communication and data compression, reportedly results in lower over-

all network operating costs.

Finally, Pixnet's third benefit is its ability to address any mainframe from any terminal, the spokesman observed. This is reportedly done in Pixnet without interaction and disruption in the IBM mainframe.

"Many users install and operate dedicated terminals for each application because dynamic connection has not been available," a Paradyne official said. "With Pixnet, a user can access a [Customer Information Control System] program to update a customer's record, for example, then disconnect in seconds and reconnect to

another application for inventory control."

He added that the ability to communicate with more than one mainframe will be especially helpful to users of distributed data bases. "If customer records are stored on multiple mainframes in the network, Pixnet will allow the terminal operator to sign on and perform transactions on all of these mainframes."

On a three-year lease, Pixnet network control units start at \$190/mo plus maintenance. Deliveries will begin in the fourth quarter, Paradyne said from 8550 Ulmerton Road, Largo, Fla. 33541.

MSI Adds Family of Terminals

COSTA MESA, Calif. — A family of handheld, calculator-size terminals that allows the user to add plug-in modules is available from MSI Data Corp.

The MSI/88d features a dy-

namically allocated memory that is automatically segmented into independent pages as information is entered by the terminal's users, a spokesman said. It makes available to each successive user all unused memory and can reallocate storage for previously recorded pages in which additional data must be recorded.

The MSI/88d costs \$1,100 with 16K bytes of memory. Each additional 8K bytes costs \$200.

The MSI/88e allows the user to load a series of applications programs, rather than restricting the user to a fixed program. The applications can be loaded either through the company's "Ecom" two-way communications module, which enables a remote host system to send the applications program over dial-up lines to the terminal's 16K- to 64K-byte memory, or through MSI's Programmer, a cigarette pack-sized module that stores a program in its own memory.

The program is loaded when the module is plugged into the top of the terminal. Cost of the MSI/88e with 16K bytes of memory is \$1,100.

The MSI/88f adds full alphanumeric capability, replacing the 88e's 16-digit, seven-element display with a 16-character, 14-segment display.

The MSI/88f's keyboard is expanded to 28 keys, including a shift key that permits the full 26 alpha characters, as well as a complete selection of numbers and symbols. The keyboard can be customized and special legends added. Cost is \$1,500 with 8K bytes of memory.

If the user has a specific program to write into the system,

Correction

An account of the latest Telemem Communications Corp. portable terminal, the P-188A, incorrectly called it the P-888 [CW, June 11].



MSI/88 Programmer

the MSI/88 Application Development System can be purchased and installed in the user's facility. Alternately, it is available for use at any of MSI's Regional Programming Centers.

The system enables the user to write his own application programs and load them into Programmer modules for distribution to terminal installations or to load these programs into a host computer for subsequent down-loading.

The MSI/88 Application Development System is a complete turnkey system. It includes a microcomputer with its own operating software and program compiler, floppy disk subsystem for program storage, CRT operator console, output printer, terminal simulator and erasable programmable read-only memory (Eeprom) writer.

The purchase price of the Application Development System is yet to be determined. Programmer program load modules that are preprogrammed have an average cost of \$200. Unprogrammed modules cost \$200 to \$400.

The Econ two-way communications module sells for \$350 to \$750, depending on whether it involves a built-in modem, a free-standing modem or an acoustic coupler, the spokesman said from 340 Fischer Ave., Costa Mesa, Calif. 92626.

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Notes and observations from IBM
that may prove of interest to
data processing professionals



Packaging Cup-a-Soup, Lipton's popular "real soup in an instant." An online computer system helps the company monitor cash payments closely. This holds bad-debt exposure down without offending or disrupting good customers.

Receivables: An Early Warning System for Lipton

"Within seconds each morning I can review the status of any one of our 4,500 customer accounts. At 9:00 A.M. we can see customers' receivables status based on sales and lockbox receipts at the close of the prior day."

Ronald Papke, corporate credit manager for Thomas J. Lipton Inc., the \$600 million per year food and beverage manufacturer, is describing his computerized accounts receivable-credit management system. At night, it automatically applies sales and cash to customer accounts, marks off 55 to 65 percent of check payments against invoices, updates all customer credit history files, generates correspondence for deductions taken by customers, and produces selected reports for Papke and regional credit managers.

By day, the results are available to Papke's headquarters staff on IBM 3278 Visual Display Stations. Accounts receivable clerks mark off cash items not automatically applied at night by touching light pens to displays of invoice data. Then credit personnel use the terminals to display customer data.

"Today we have greater control of our clerical operation," Papke notes. "In the past, we faced a heavy morning workload to meet an early afternoon cutoff for batch input. Now that we enter data online we can control our priorities. This not only increases clerical productivity, but—more

importantly—the credit department has a far better picture of each customer's status."

Using the IBM Interactive Query and Report Processor (IQRP), the Credit Department selects the criteria for extracting information from the online files. They can choose, for example, total agings of all customer activity; 30, 60, or 90-day specific aging of a customer's account; or determine if and how often a customer has gone beyond discount period. All of these inquiries are entered through the terminal, which is online to Lipton's 3032 Processor at its Englewood Cliffs, New Jersey headquarters. The result can be displayed within seconds or printed overnight as a one-time or scheduled report.

The light-pen cash-application system at Lipton uses the Customer Information Control System/Virtual Storage (CICS/VS), an IBM program product that manages the transactions and supports the terminals in an online system. IQRP and CICS provided us with a relatively simple and low-cost method of expanding our previous system to meet our growth requirements," says Leonard Langley, business systems manager. "With our Credit Department's help we have been able to get maximum return on our original investment while developing systems to give our users full benefit of current technology."

ACCO 'Runs the Business' With DL/1

"We run the business from our data base," says Allan D. Elstien, director of data processing for ACCO International Inc., a Chicago manufacturer that uses IBM's Data Language/1 (DL/1).

"It is the ideal data-base system for us," Elstien notes. "It grows as the company grows; we can change record structures without affecting existing programs. For example, to add shop floor routings, we just added pointers to the item records."

At ACCO, a major producer of binders, paper clips, and other paperfastening and storage products, an IBM System/370 Model 138 performs complete online customer order processing and inventory control.

After clerks enter orders directly through online terminals, the computer sorts the items into warehouse picking sequence, generates the picking documents and invoices, tracks the order until it is shipped, extends the pricing and prints the invoice. DL/1 also keeps track of ACCO's complete

inventory of products.

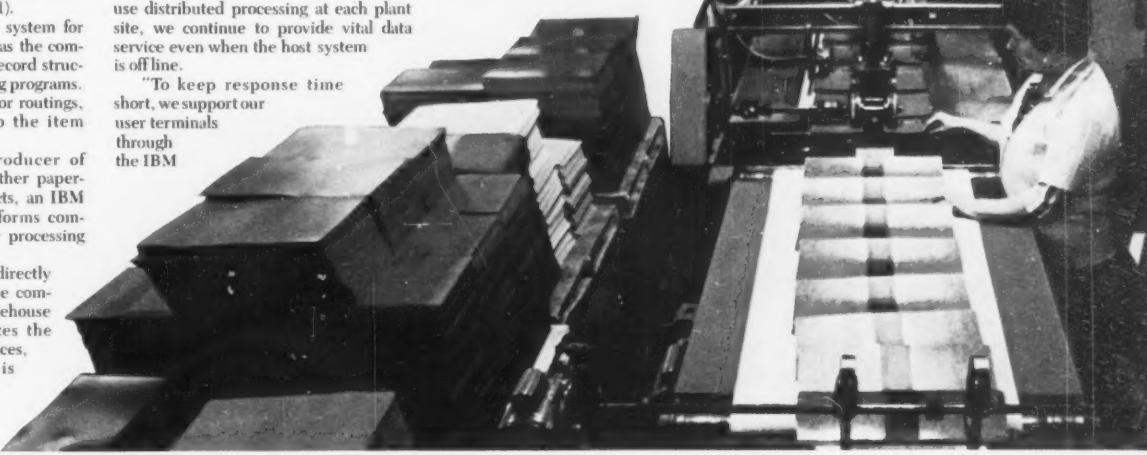
Online inquiry provides reliable current information on the availability of merchandise and on the status of a customer's order—including such details as when and how it was shipped, by what truck line, how much it weighed and when it is due to be delivered.

"Thanks to the centralized data base, information is now consistent throughout the company, including our four manufacturing locations," he adds; "people performing related functions are working from the same numbers. And, because we use distributed processing at each plant site, we continue to provide vital data service even when the host system is off line."

"To keep response time short, we support our user terminals through the IBM

3790 Communications Systems, offloading the central processor. And the distributed system places the data base close to the user who maintains it and takes responsibility for data entry—insuring that information will be current and free of input errors."

Elstien sums up: "DL/1 and the distributed network laid the foundation for the customer service and management information that power this business today."



ACCO makes these colorful data processing binders at its Ogdensburg, N.Y. plant. The company uses a DL/1 data base and distributed processing to achieve consistently high customer service levels.

Graphics Meet Calendar Released

BOSTON — The Institute for Graphic Communication, Inc., has released the calendar for the intensive, small-group conferences in graphics communications technology and marketing to be held during July, August and September.

"Diagnostic Imaging Trends and Markets" and "Computer Graphics for Business Applications" will both be held at the Andover Inn in Andover, Mass. July 15-17 and July 17-19, respectively.

"Outlook for Video Disk Systems" and "Advances in Real-Time Ultrasound" will be given at the Highlands Inn in Carmel, Calif., July 22-24 and Aug. 5-7, respectively.

"Coated Products, Systems and Markets" and "Update on Impactless Printing" are slated for Aug. 19-22 and 26-28, the former to be held at the Radisson Ferncroft Hotel in Danvers, Mass., and the latter at Carmel's Highlands Inn.

Sept. 16-18, the institute will present "Extended Repro-

graphic Systems for the Future," and "Update on Emission Computer Tomography" will be presented Sept. 18-20. Both conferences will take place at the Andover Inn.

Finally, "Photolithography in Integrated Circuit Manufacture" and "Office of Tomorrow" are scheduled for Sept. 19-21 at the Novotel Hotel in Amsterdam, The Netherlands and Sept. 23-25 at the Chatham Bars Inn on Cape Cod, Mass.

Conferences at the Andover Inn, including room and meals, cost \$460 per registrant. Those at the Highlands Inn, Chatham Bars Inn and Radison Ferncroft Hotel cost \$495 per person with room and meals.

The Novotel Hotel sessions in Amsterdam cost 885 Dutch guilders, or approximately \$445. More information is available from the institute at 375 Commonwealth Ave., Boston, Mass. 02115.

Multiplexer System Bows

SANTA ANA, Calif. — A multiplexer system that draws from high- or low-level power sources is available from Tustin Electronics Co.

The Tustin 3000 includes a multiplexer, a programmable gain amplifier, a sample and hold amplifier and an analog-to-digital converter. The unit can be used for low-level sources such as strain gauges and thermocouples as well as potentiometers and other high-level sources, Tustin said.

The multiplexer can be expanded to more than 2,000 channels in eight-channel increments.

The multiplexer and analog-to-digital converter together cost \$3,600, while the multiplexer alone costs \$1,600, the vendor said from 1431 Andrews Place, Santa Ana, Calif. 92705.

Test Set Uses SDLC Protocol

SPRINGFIELD, Va. — A data communications diagnostic test set using IBM's Synchronous Data Link Control (SDLC) is available from Dynatech Data Systems.

The Dynatest 2000 operates in NRZI-inverted or non-NRZI modes, where the correct flag character and bit-stripping mechanism is selected to monitor SDLC. Dynamic simulation and monitoring is available through special macro instructions.

The rack model Dynatest unit with tape drive costs \$12,250; the portable model costs \$12,535.

Without the tape drive, a rack model Dynatest costs \$9,950 and a portable model costs \$10,235, Dynatech said from 7644 Dynatech Court, Springfield, Va. 22153.

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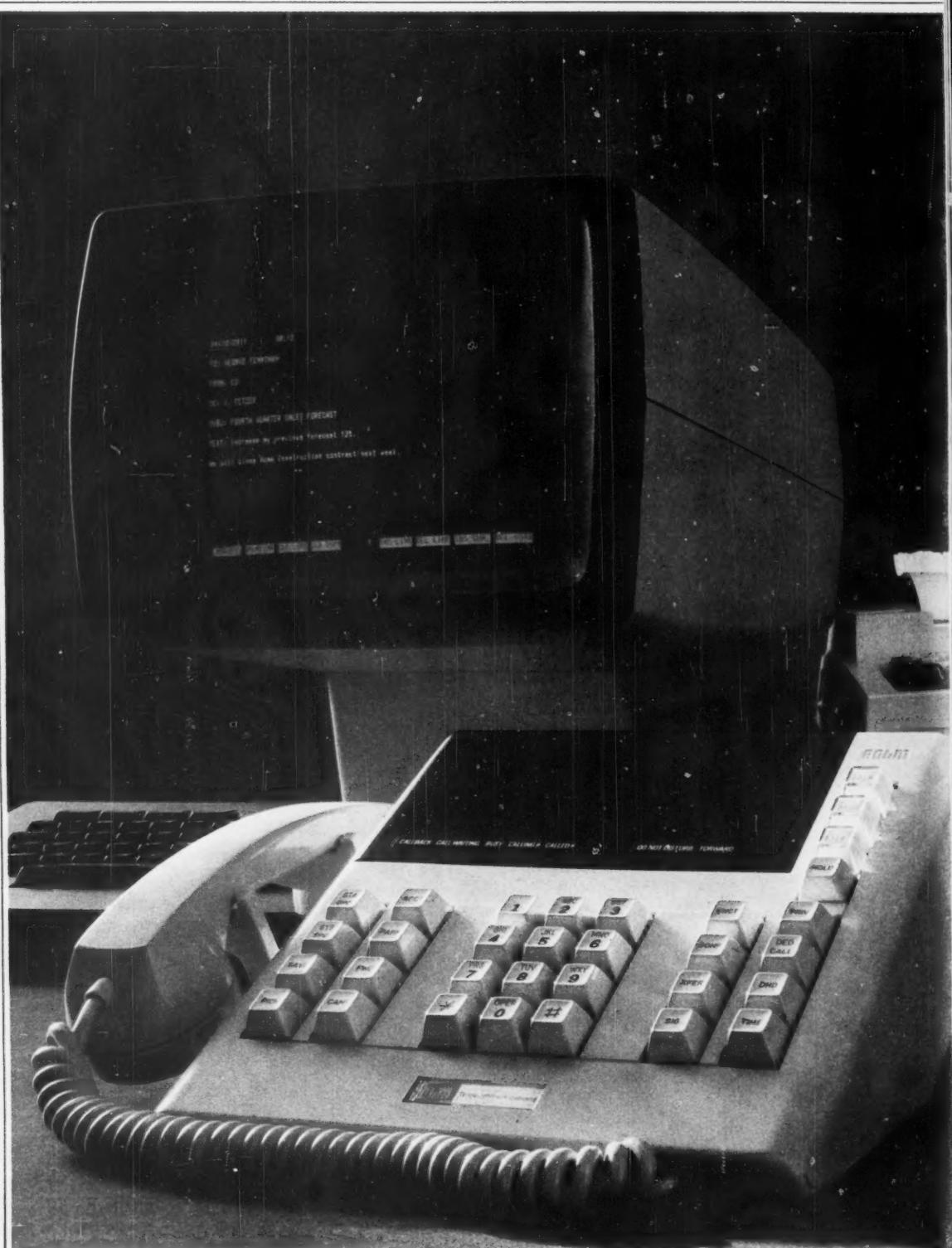
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Quiz answer: Marital Status.

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Information Service Offered

DELRAN, N.J. — A loose-leaf information service designed to help DP and communications professionals design, implement and manage communications systems is available from Datapro Research Corp.

Subscription to the service includes two volumes of problem solution reports on communications methods, systems and equipment. Monthly update supplements, an industry-specific newsletter and use of the firm's telephone inquiry service are included in the charter subscription price of \$280. The service is offered free for a 10-day review.

The solutions package covers nine major topic areas. Following an introduction to concepts and definitions, the package covers the best ways of using narrowband, voice-grade and wideband channels.

It then discusses half- and full-duplex systems, asynchronous and synchronous transmissions, analog and digital transmissions, protocols and codes, multiplexing and concentrating, switching and private-line services and public and private networks, according to Datapro.

Datapro is at 1805 Underwood Blvd., Delran, N.J. 08075.

HP Introduces Modems For 1000, 3000 Systems

PALO ALTO, Calif. — Hewlett-Packard Co. has introduced modems specifically designed for incorporation into the company's HP 1000 and HP 3000 systems.

Matched by HP to system requirements, the modems are said to prevent system/modem interaction problems and contribute to maximizing system uptime.

The HP 37210T is a 4,800

bit/sec modem for use on dial-up or leased telephone lines, while the HP 37220T is a 9,600 bit/sec modem for leased lines.

The HP 37210T operates in half-duplex, full-duplex or multi-drop modes and is used in pairs on dial-up lines. The modem was designed around a microprocessor that performs most of the signal functions and several diagnostic tests.

Optional remote loop-back allows a local user to form a loop-back at a remote site without the presence of the remote site operator, the company claimed.

The HP 37220T provides synchronous point-to-point communications on leased telephone lines. It has a 4,800 bit/sec fallback mode that can be used if the line quality becomes severely degraded, HP indicated.

The HP 37210T costs \$4,350. The optional built-in data access arrangement and auto answer, usually required for dial-up lines, costs \$510. The auto loop-back option costs \$400.

The 37220T sells for \$6,150, with quantity discounts up to 23%. HP is at 1507 Page Mill Road, Palo Alto, Calif. 94304.

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telephone system. It can be easily upgraded when new software comes along, can test itself and allows the service organization to perform remote diagnostics. Changes to the CBX are made by operating system commands.

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Bits & Pieces

Power Distribution Unit Cuts Overall Losses 30%

LOS ANGELES — An increased-efficiency version of the Powermobile computer power distribution system from Data Processing Power Corp. is said to reduce overall power system losses by up to 30%.

The system, available in power ratings ranging from 15 kVA to 150 kVA, is said to have an overall efficiency rating in excess of 98%, as opposed to the typical 95% to 96% efficiency of similar, isolation transformer-based devices. This can contribute significantly to the user's energy savings, a spokesman stated.

The UL-listed unit can reduce the current input required to produce a given power output, as well as reduce the temperature in transformers and other circuitry by up to 6%, the company claimed.

Typical prices on a 15 kVA unit start at \$7,745 and go up to \$17,005 for a 150 kVA unit, a spokesman said from 12638 Beatrice St., Los Angeles, Calif. 90066.

OCRUA to Hold July Meet

HACKENSACK, N.J. — The Optical Character Recognition Users Association (OCRUA) will hold its summer conference at the Park Plaza Hotel in Boston July 15-18. Francis Belotti, attorney general of the Commonwealth of Massachusetts, will be the keynote speaker.

Special sessions of the meeting will explore OCR wands, image processing, service bureaus, voice recognition and other commercial areas. Dr. Stephen Merritt, audit manager of the Office of the Comptroller General of the U.S., will be the luncheon speaker on July 16 and will report on government directions in data entry.

Expo '79, to be held concurrently with the conference, will feature displays of OCR equipment, supplies and services. Further information is available from OCRUA at 10 Banta Place, Hackensack, N.J. 07601.

Fall USE Conference Set

BLADENSBURG, Md. — USE, Inc., the technical and professional organization for users of Univac 1100 systems, will hold its annual fall conference Sept. 10-14 at the Diplomat Hotel in Miami, Fla.

Dr. Carl Hammer, director of computer science for Univac, will be the keynote speaker for the meeting.

Further information on the conference is available for USE at Box 461, Bladensburg, Md. 20701.

Light Pen, CRT Technology Not as Magical as It Looks

By Gary L. Newkirk

Special to CW

Although CRT light pens are now familiar to most DP users and readers, many people in the field are unfamiliar with how these devices actually work. The devices sometimes appear almost magical but, as with most magic tricks, the technique behind them is really rather simple.

The technology that operates light pen systems has been available since the 1950s, and the device continues to be a convenient input tool for both alphanumeric and graphics display systems. The key to understanding how they work is understanding how CRTs themselves work.

Information is displayed on the face of the CRT via an electron beam originating in the neck of the tube. Components in the neck of the tube control the horizontal and vertical movements of the beam.

By varying the electrical parameters of the control mechanism, the beam can be made to sweep across and down the face. The amount of time required for a complete sweep is a precisely controlled quantity.

Two Signals Recognized

The light pen is a photodetector with an attached switch (often, though not necessarily, located in the pen itself). When the switch is closed, the circuitry recognizes one of two states — "light detected" or "no light detected."

This information is integrated with the information on the location of the electron beam at that precise instant to produce a logical condition, which is then tested by the program like any other program decision. Because the beam sweeps, or "refreshes," the face of the CRT many times during a short period, it is not difficult to synchronize the light detection signal with the beam position.

Assume, for the sake of simplicity, that a sweep of the beam from the upper left-hand corner to the lower right-hand corner of the CRT takes exactly one second. The beam refreshes a character in the center of the tube precisely one-half second after it begins the sweep.

When the beam passes the light pen, which is pressed against that character, the light intensity increases and the photodetector sends a signal to the circuitry. This signal, or pulse, is then massaged by the circuitry and

rendered into usable form.

A character field displayed on the CRT and subject to selection by the light pen is preceded by a special character that identifies it as a selectable or detectable field. The pulse from the pen indicates a "hit" on that spot, and the program handles the event by normal program logic.

In a graphics application, the circuitry must detect two points — the endpoints of a vector — instead of one. To work properly, of course, the system must receive the pulse while the coordinate is still logically significant in time.

The first time the pulse is detected, the system understands the event to signal the beginning of a line. The second pulse indicates the endpoint; the software constructs the vector internally and then displays it.

With the use of a "tracking symbol," the pen can be used to draw lines. The tracking symbol consists of a central spot indicating a coordinate on the CRT and four straight lines boxing in the central spot. The straight lines are in the pen's field of view.

As the pen moves away from the central point, one of the four lines moves out of its field of view. Logic circuits detect this movement and its direction and move the symbol so it is again centered under the pen.

If there are circuit delays, a "rubber band effect" may be seen as the display attempts to keep up with the pen. However, when the switch is operated to indicate the end of the vector, the display settles down to a straight line.

Graphics can also be obtained by means of a raster display. In this method, approximate curves are drawn with a large number of defined characters; the resolution depends on the size of the characters.

A "character blast" fills the screen with a known character, usually composed entirely of dots, in all positions. The light pen is moved from position to position to designate endpoints. Position detection is handled as in an alphanumeric display, but programming is used to connect the endpoints, producing the desired curves.

Thus, even the apparently magical properties of the light pen are easily explained in engineering and programming terms.

Newkirk is a staff engineer with the Systems Communication Division of IBM's Display Device Design department in Kingston, N.Y.

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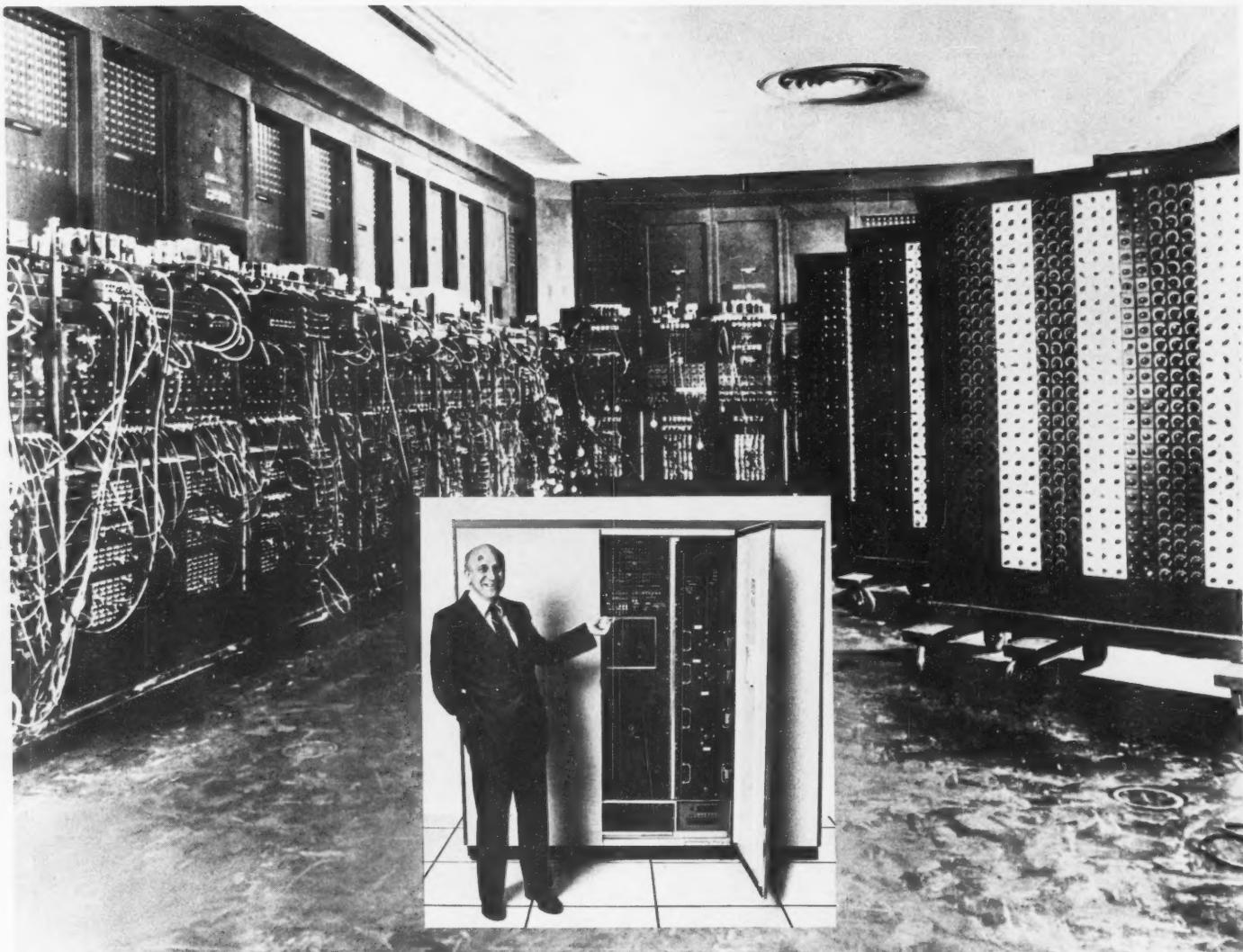
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WHO WOULD HAVE OF GOLIATH WOULD BE



Dr. J. Presper Eckert, vice president of Sperry Univac and co-inventor of the first electronic digital computer, ENIAC, poses with the 1100/60 computer (inset), and his giant computer, invented in 1946. Headlines that year announced the amazing Electronic Numerical Integrator And Computer "...that runs on over 18,000 vacuum tubes and performs 5000 additions per second!"

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To say, with this introduction, that the cost of large-scale data processing has just come tumbling down, while reliability takes a giant step forward, would be an understatement.

It would also overlook perhaps the most dramatic story yet to be told in the history of man's conquest of inner and outer space. That story is the miracle of miniaturization, starring one of the world's tiniest "engines," the microprocessor. Over the past two decades, man's machines have been shrinking ever smaller in physical size, while capability and performance levels are surging ever higher.

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years in development, it is the most powerful mainframe ever engineered with a heart of multiple microprocessors.

With this 1100/60, we enter a vastly simpler, more efficient new world of general-purpose microprocessors. To you, this means a new simplicity of operation, a new degree of parts interchangeability, easier maintainability, and a design more naturally suited to growth and modular addition.

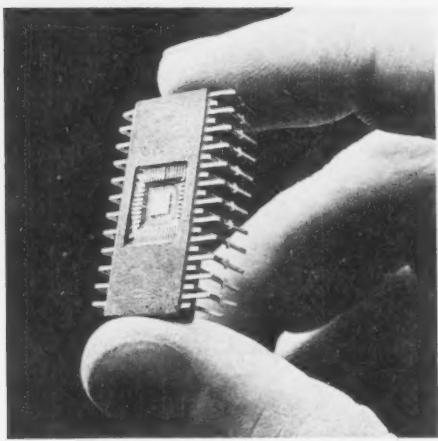
What's more, with a cost-effective method of duplexing instructions and working around faults, the 1100/60 sets a new world standard for mainframe reliability.

At the same time, we are introducing our new DCP/40 Distributed Communications Processor, the network control system that ties your entire system together and allows you to realize a more efficient, more flexible method of handling batch, interactive and transaction modes simultaneously.

The 1100/60 is a system you can start with and stay with, through a five-fold increase in initial requirements, insulated against the trauma and expense of swapping out a dead-end system.

In a single 12½ square foot processing cabinet, medium-sized users now have the same large-scale functionality as some of the largest users in the world today, like Toyota and Lufthansa.

In short, the 1100/60 has all the advantages of large-scale processing without the penalty of large-scale price. Or the complications of a two-year wait for delivery. Your 1100/60 can be up and running anywhere in the world within six to nine months of order. For more information, call your local Sperry Univac representative or write Sperry Univac, P.O. Box 500, Blue Bell, Pa., 19424.



The miracle of miniaturization... A single microprocessor is in many ways more powerful than an entire 1946 ENIAC computer, covering 1,500 sq. ft. Today's 1100/60 Computer has literally scores of these microprocessors.



"I like to think of it as the 'David' of computers."



1100/60 COMPUTER.

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Multicolor Printer/Plotter Features Impact Dot Matrix Technology

IRVINE, Calif. — The Colorplot 100 printer/plotter, recently introduced by Trilog, Inc., is said to be the first device to provide impact dot matrix color plotting and printing at line printer speeds for prices considerably less than ink-jet or electrostatic devices.

An 11-in. long, three-color plot takes about 3 min, the firm claimed, while a single-color plot can be done in 45 sec.

By dividing the device's ribbon into three sequential, dif-

ferently colored areas and overprinting a particular point on the plot with two or three of the colors, a range of colors beyond the three on the ribbon can be produced, a spokesman noted.

Offers 100 Dot/in.

Dot resolution on the \$10,000 device is 100 dot/in. horizontally and vertically, he said. Up to six-part paper can be used.

Text can be printed at 150 line/min with the 96-character Ascii set; using a 7 by 7 dot-

matrix instead of the standard 7 by 9, a speed of 250 line/min can be achieved, according to Trilog.

Other features of the unit include a standard parallel interface, one-year limited warranty, a built-in self-test capability and 90-day, on-site service.

Trilog is located at 16750 Hale Ave., Irvine, Calif. 92714.

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Kybe Unveils Bulk Eraser For Tapes

WALTHAM, Mass. — A magnetic bulk tape eraser recently introduced by Kybe Corp. here is said to exceed all government standards for erasing performance and operator safety in magnetic tapes.

The AD-60 can erase a tape from saturation down to at least -90 db in 45 sec, the vendor claimed.

Bulk erasing "revitalizes" tape by eliminating background noise and distortion that result from incomplete erasure on tape drive, a spokesman explained. Distortion erodes tape reliability, particularly the reliability of tapes used on high-density systems.

Security Measure

In addition, bulk erasing completely removes confidential information from magnetic tapes, eliminating that source of data theft, he said.

The AD-60 features indicators to show the status of the system.

Reel diameters up to 15 in. can be accommodated, and interchangeable hubs for IBM-, DIN- and NAB-compatible reels are available.

The AD-60 costs \$1,650, Kybe said from 132 Calvary St., Waltham, Mass. 02154.

Three UPS From Sola Offer 90% Operating Efficiency

ELK GROVE VILLAGE, Ill. — Three uninterruptible power supplies (UPS) recently introduced by Sola Electric for large-scale computer users are said to have an operating efficiency of 87% to 90%.

The units, available in 75, 100 and 150 kVA capacities, will be available in the fourth quarter.

Output voltage of the units can be adjusted +5% from the rated UPS output, a spokesman said; the units feature a total harmonic distortion of under 3%.

'People Problems' Set As Data Entry Workshop

SANTA ANA, Calif. — Two workshop/seminars dealing with "People Problems" in data entry will be presented this summer by *Data Entry Digest*.

Scheduled in New Orleans on June 26-27 and in Boston Aug. 8-9, the seminars will be especially relevant for data entry managers who must deal with operator turnover, low morale and poor productivity, the sponsor said.

Special emphasis will be placed on improving attitudes, developing training programs, evolving incentive plans and perfecting techniques for selecting successful operators.

For the first time, data entry managers will be taught Transactional Analysis (TA) as a tool for managing DE operators, a spokesman noted. In addition, individual workshops will deal with developing aptitude tests for selecting productive operators, developing better communication skills and evaluating incentive techniques to motivate people.

The seminar, to be presented by the professional staff of the magazine, costs \$389. Registrants should make their own hotel reservations, the spokesman advised; the New Orleans seminar will be presented at the New Orleans Hyatt Regency Hotel, while the Boston seminar will take place at the Boston Hyatt Regency.

Additional information is available from the magazine at 10522 Ridgeway Drive, Santa Ana, Calif. 92705.

OCR-A Printers Operate At Maximum 200 Label/Sec

KEENE, N.H. — A family of three OCR-A printers for retailers has been introduced by the Scanmark Division of the Markem Corp.

The three printers — the U-1274, which prints four lines, the U-1276, which prints six lines, and the U-1278, which prints eight lines — print OCR-A characters on plain or preprinted labels or on tags to Universal Vendor Marking (UVM) specifications.

Operating at a maximum speed of 200 label/min, the devices can either be attached to a host via an RS-232C interface or can operate stand-alone via prompting and input through an integral CRT.

Options include a fixed stacker/cutter, integral rewind and stacker-full switch.

The 1274 costs \$5,850, the 1276 costs \$6,980 and the 1278 is priced at \$7,680, the firm said from 150 Congress St., Keene, N.H. 03431.

Guide to Micrographics Now Available From NMA

WASHINGTON, D.C. — The seventh edition of the *Guide to Micrographic Equipment* is available from the National Micrographics Association (NMA).

Edited by Daniel M. Costigan of Bell Telephone Laboratories, chairman of the NMA

Publications Committee, the guide lists micrographic equipment, specifications and prices.

Several changes have been incorporated into the work. Volume 1 includes both production equipment as well as computer output microfilm (COM) recorders, while Volume 2 continues to concentrate on user equipment.

Listed in Volume 1 are cameras and camera-processors, COM units, film processors, duplicators, enlarger-printers, special equipment and accessories and miscellaneous equipment.

Volume 2 lists readers, reader/printers, hand viewers, automatic retrieval systems, special equipment, storage equipment and accessories.

The guide costs \$30 for NMA members, \$40 for non-members. To order, purchasers can send check, money order or purchase order to NMA Publications Sales, 8719 Colesville Road, Silver Spring, Md. 20910.

In 20M, 40M and 80M Bytes OEMs Offered Winchester-Type Drives

LEXINGTON, Mass. — Three Winchester-style disk storage subsystems from NEC Information Systems, Inc. reportedly improve data integrity and access time for North American manufacturers who wish to incorporate the drives in their products.

The drives, part of NEC's D-1200 series, use fixed-disk media and read/write heads encapsulated in a sealed module. An industry-standard interface incorporated in each disk drive is said to facilitate attachment of the drives to any computer currently using storage module disk devices. All components, including circuitry, power supplies, the module and recording media, heads and rotary actuator, are manufactured by NEC.

The units feature a latency time of 8.3 msec, average seek time of 40 msec and a data transfer rate of 1.2 Megabyte/sec, spokesman claimed.

In addition, the units — which are said to have a mean time between fail-

ure of 10,000 hours and a mean time to repair of 30 minutes — are field-upgradeable in a short period of time, the spokesman said.

Dual-Port Feature

A dual-port feature permits single or multiple clusters of drives to be accessed from two different CPUs, the company noted. An address mark detector option available with the units adds an additional level of internal security of data by insuring the validity of address mark information prior to data transfer to the controller.

A front-panel option provides operators with "ready" and "fault" indicators, a write-protect switch to prevent alteration of data and an on-off switch.

Start time for the units is said to be less than 30 msec, while stop time is less than 20 msec. The recording code is Modified Frequency Modulation (MFM), and the interface code is the standard non-return-to-zero, the firm said.

Formatted capacities, based on 60 sectors per track, are 16M bytes, 31.9M bytes and 63.9M bytes, respectively, for the three units.

Both slide-mount and rack-mount configurations are available.

The cost of the 20M-byte Model 1210 begins at \$2,950, the 40M-byte Model 1220 at \$3,200 and the 80M-byte Model 1240 at \$3,870. NEC Information Systems is at 5 Militia Drive, Lexington, Mass. 02173.

Plotter Gains Controller

CONCORD, Calif. — Nicolet Zeta Corp. (formerly the Zeta Research, Inc. division of Nicolet Instruments, Inc.) has combined its Model 1200 plotter and its Model 53 controller into one unit, the Model 1553 digital incremental plotter.

Operating at 10 in./sec on vertical and horizontal axes and 14.14 in./sec on the diagonal, the unit features circle/arc generation, dot/dash generation and scale and rotate features. It has a resolution of .0025 in.

The \$5,950 unit has a built-in RS-232 interface, the company said from 2300 Stanwell Drive, Concord, Calif. 94520.

COM Recorders Added by NCR

DAYTON, Ohio - NCR Corp. recently announced the first of a projected family of computer output microfilm (COM) recorders that it claimed feature the fastest throughput speeds of any system currently available.

The first member of the planned family of seven, the NCR 1105, operates off-line to produce one piece of 4- by 6-in. file in 30 sec, the firm stated. Designed to be compatible with the magnetic tapes used with most mainframes, the 1105 provides editing and formatting capabilities in conjunction with the CRT console.

The \$80,000 unit uses industry-standard, 105mm film and provides reduction ratios of 24X, 42X, 48X and 72X. First deliveries of the system are scheduled for early 1980.



NCR 1105

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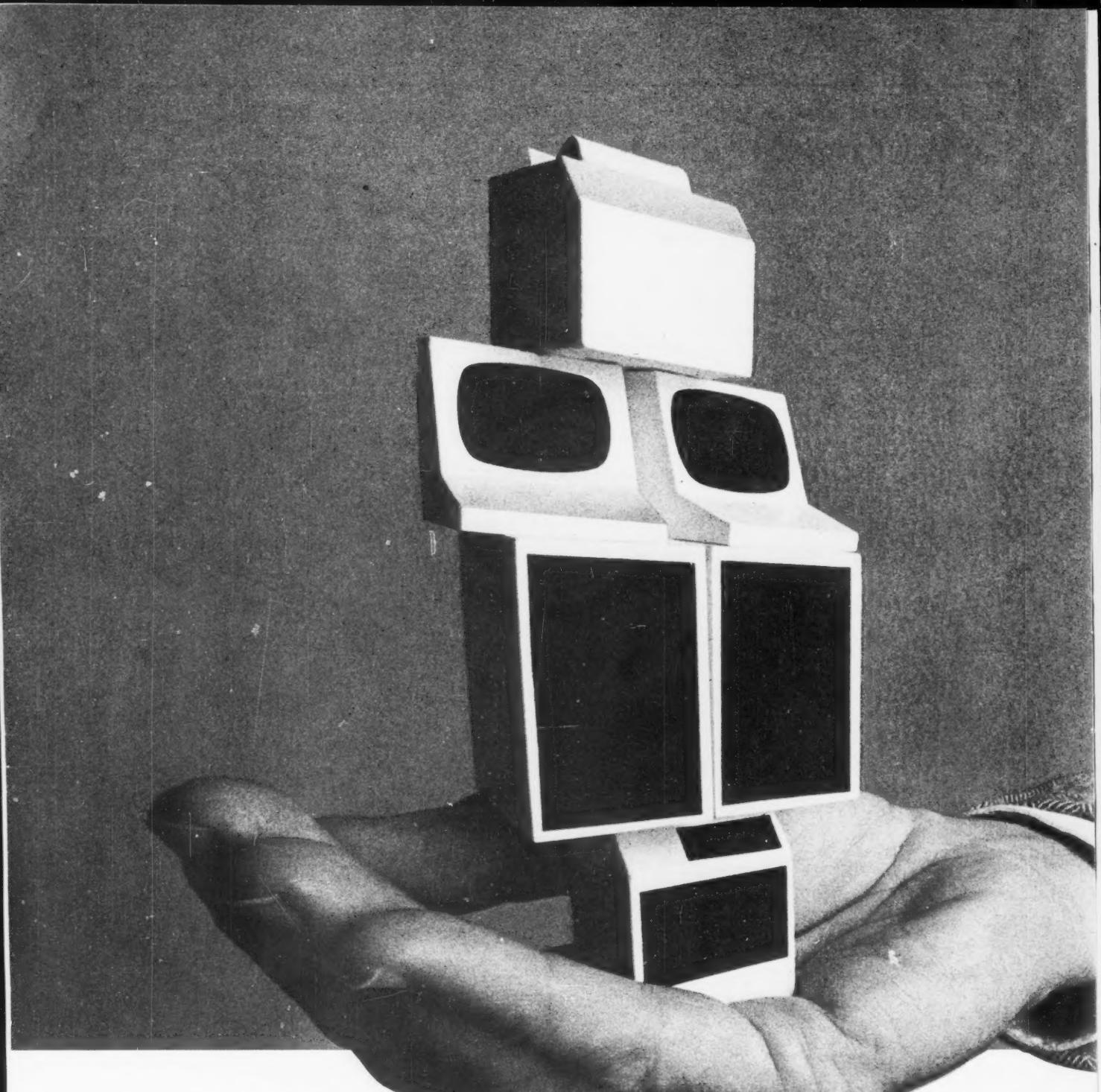
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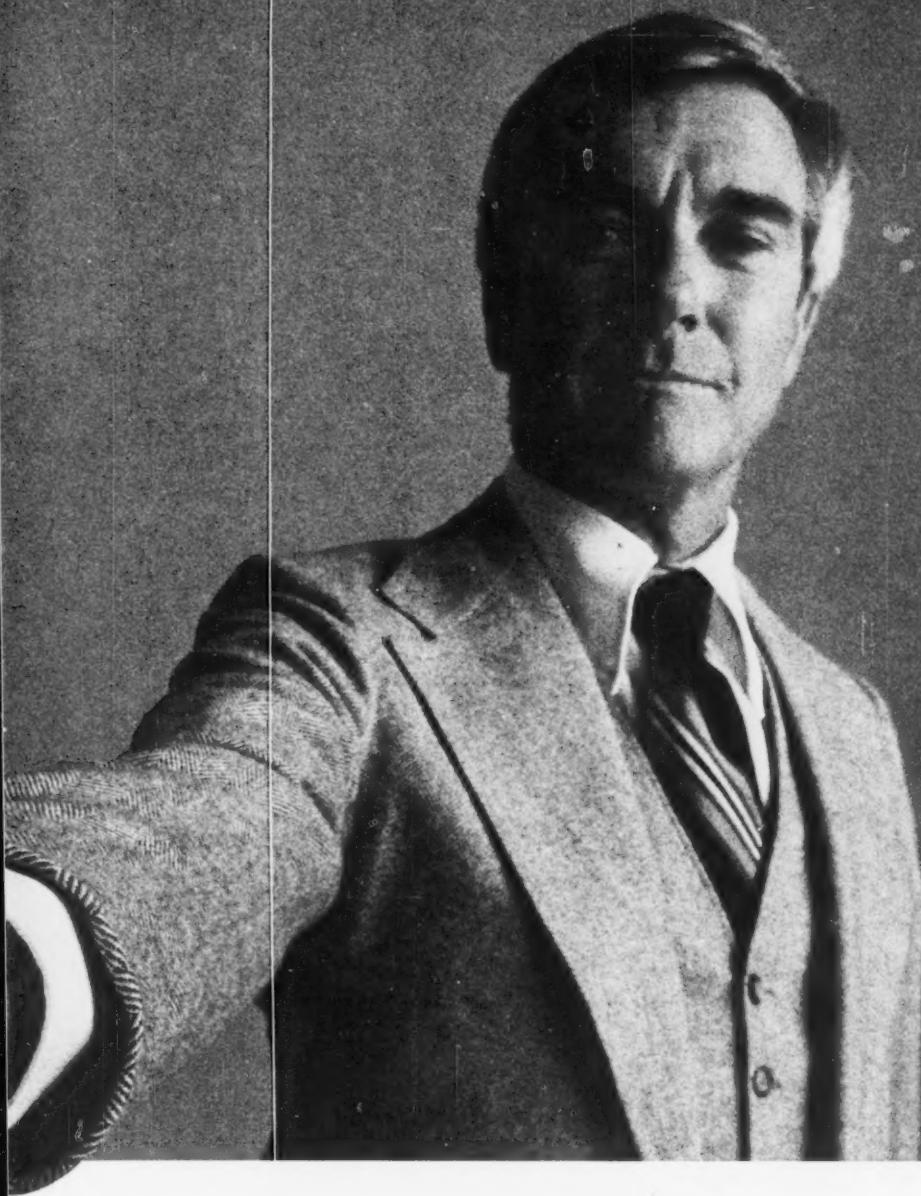
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80 megabytes of disk storage. It can handle a variety of high-speed peripherals, including card readers, line and character printers, and tape drives.

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get done faster. For instance, training is easy. The XL was designed for source department personnel.

We've even made buying or leasing the XL simpler. You'll deal with one single source for design, installation, follow-through and service.

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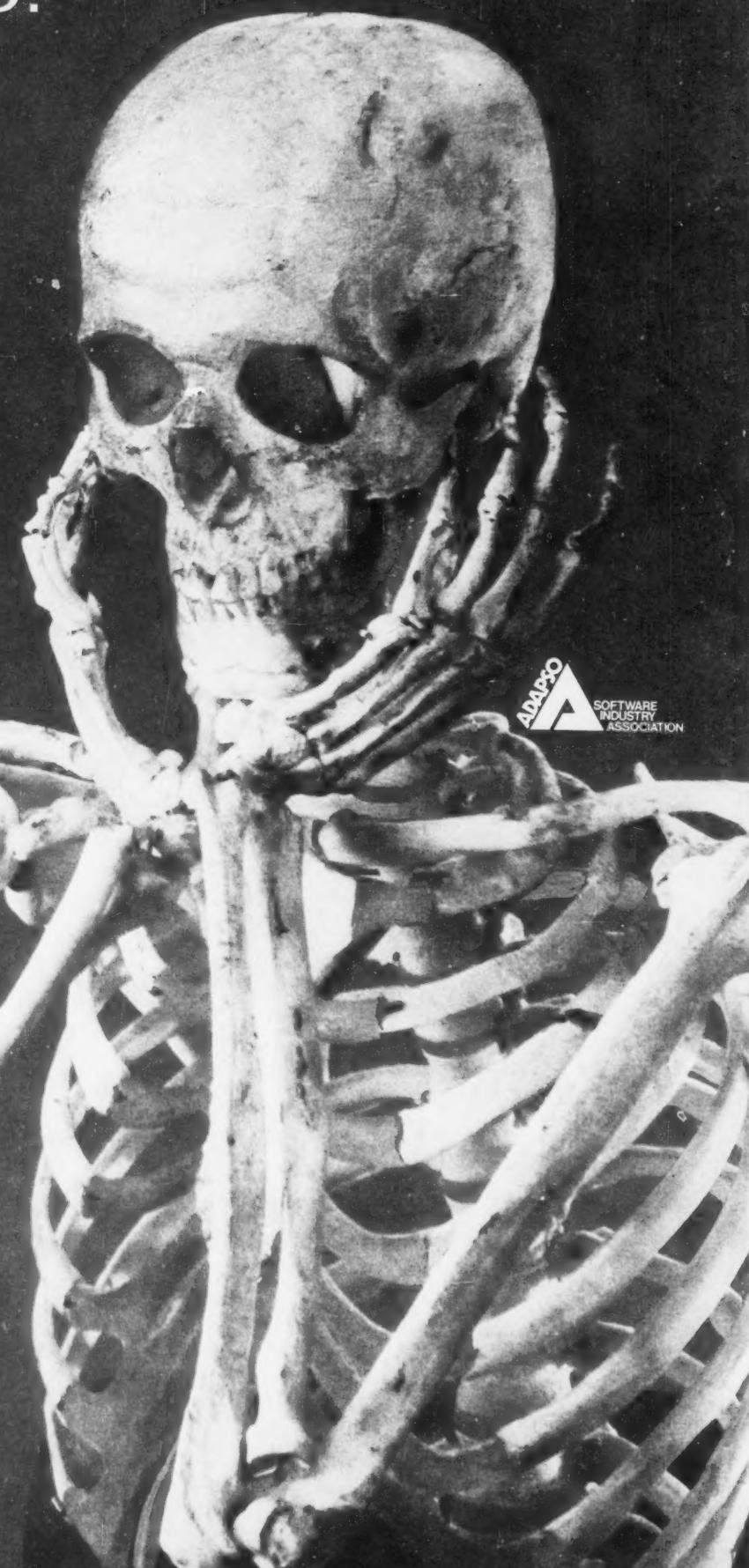
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Modcomp Adds to Classic System Line

FORT LAUDERDALE, Fla. — Modular Computer Systems, Inc. has added two CPUs that reportedly execute most instructions in less than 400 nsec to its Classic family of minicomputers.

As stand-alone systems, network hosts or network satellites, the Classic 7830 and 7835 minis suit applications in manufacturing, government and the power

industry, according to a Modcomp spokesman.

The basic 7830 series systems are wirewrapped printed circuit board assemblies that contain the central processor, memory interface and an integral I/O processor.

With the exception of the Extended Instruction Mode, the systems execute the entire Classic

instruction set including Modcomp's Fortran enhancements, the spokesman claimed.

Both the 7830 and 7835 are compatible with the Max III and Max IV operating systems. The only difference between the two machines is that the 7835's modular bus control (MBC) option slot includes the Classic arithmetic accelerator to provide

high-speed floating point and shift operations, the spokesman said.

The two CPUs are said to execute most register-to-register instructions in a minimum time of 300 nsec, and 16 sets of 15 general-purpose registers are provided to maintain compatibility with the Max IV operating system.

The integral I/O processor provides 16 direct memory processor (DMP) channels and operates at up to 1M byte of I/O throughput in the dual-word mode, the spokesman claimed.

Sixteen priority interrupt levels and 128 sublevels are provided and remote multiprocessor interrupts are standard, as is a remote fill capability.

Error-Correcting Memory

The firm's new 128K-byte solid-state error-correcting memory printed circuit board, offered separately, is a key to the machine.

(Continued on Page 42)

Including Printer, CRT

Peripherals for Series/1 Debut

MINNEAPOLIS — Control Data Corp. has added 21 fixed-disk models, a band printer and a CRT station to the peripherals family it aims at users of the IBM Series/1 minicomputer.

CDC's Certainty 230 disk storage series has gained two units that hold 37.9 million bytes and 50.6 million bytes of formatted data, respectively. The series now features moving-head storage capacities of 9.3-, 25.3-, 37.9-, 50.6- and 63.2 million bytes.

Each member of the expanded 230 line includes a fixed-medium disk drive, single-board LSI controller, diagnostics and interconnections necessary for use with the Series/1, a CDC spokesman said. Average data access time for the 230s is reportedly 30 msec; the data transfer rate was put at 1.2 million byte/sec.

An optional floppy drive can be added to each 230, forming a new series of disk storage devices called the Certainty 240s. The add-on floppy drives can hold up to 606,208 bytes, the spokesman noted.

Moreover, optional 740,000-byte or 1.48 million-byte fixed-head-per-track data storage is available with any 230 or 240 unit.

Other features available with all 230 and 240 storage units include error-correction code and the opportunity for customers to in-

crease the moving-head capacity of their fixed-module drives in the field.

Band Printer

CDC also added a 1,130 line/min band printer to its Certainty 450 series. Three 450 models now serve Series/1 users.

These printers use a lightweight, horizontally moving print band that contains 384

characters divided into 48-, 64- or 96-character sets, the spokesman declared. An optional compressed-pitch print band is available with the 360- and 720 line/min models, allowing operators to switch from the standard 10 char/in. spacing to 15 char/in. as a paper-saving measure.

Finally, the vendor has released another model of the Certainty

(Continued on Page 43)

(Continued on Page 42)

NCR Beefs Up 7500 System Family

DAYTON, Ohio — NCR Corp. has announced enhancements to its 7500 line of programmable small business computers including added features for the data entry and media conversion models of the series.

The enhancements include the availability of NCR's Basic Plus 6 interpreter software for the 7520, a unit introduced last year as a data entry and media conversion product.

With the Basic Plus 6 software, the 7520 becomes a small business system, according to a company spokesman.

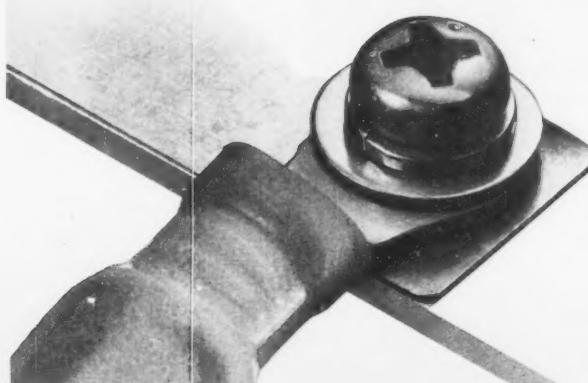
Also new for the 7520 are a number of general accounting application software packages including payroll, accounts receivable, accounts payable, general ledger and fixed asset ac-

(Continued on Page 42)



NCR Corp.'s 7520 Including Printer, CRT, Keyboard, and Flexible Disk Unit

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Four-Phase Systems
Word Processing for Professionals

Modcomp Classics Gain Pair of Processors

(Continued from Page 39)
ine's high cost/performance, the firm said.

The memory, which uses 16K random-access memory (RAM) chips, can be utilized by Modcomp's 7860 CPU as well as the 7830 and 7835, the spokesman said.

The memory density is achieved by two-way interleaving of a pair of 64K-byte arrays of memory, permitting up to 512K bytes of memory to be packaged in four slots of the eight-slot chassis.

Memory error correction is programmable and cycle time in the nonerror correcting mode is 500 nsec, the spokesman added.

The memory management system consists of 1,024 memory mapping

registers in four files of 256 registers each and multilevel memory protection is provided on a 512-byte basis. All memory is said to be directly accessible.

Shipments are scheduled to begin during the third quarter. The 7830 processor costs \$23,800, the 7835 costs \$29,500 and the 128K-byte memory board is priced at \$7,500.

Classic Peripherals

Besides the minicomputers, Modcomp announced a number of peripherals for use with the Classic family.

The 4173 series of moving head disk drives is said to offer fixed media storage in 21M-byte and 67M-byte capacities with either single- or dual-port access. A 21M-byte fixed-media drive

costs \$10,000 and a 67M-byte dual-port drive costs \$16,000.

The 4174 series of moving head disk drives offers removable media storage in 67M-byte and 253M-byte capacities with either single or dual-port access, the spokesman said. A 67M-byte single-port unit costs \$17,000, while a 253M-byte dual-port unit is priced at \$31,500.

The Model 4143 dual-access moving head disk controller allows more than one CPU to access the same disk drive, according to the firm. The controller employs upgraded software handlers and maintenance diagnostics as well as intercontroller communications to allow a request signal for access to a shared drive. Its price is \$9,275.

The Model 5550 magnetic tape sub-

system, aimed at users of larger Classic systems, can record data at 6,250 byte/in. at a speed of 75 in./sec using group coded recording technology, the firm said.

Using the phase-encoding technique, data can be recorded at 1,600 byte/in. From one to four tape drives may be used per data formatter, the spokesman said. The subsystem costs \$39,900.

Modcomp also introduced a shared multiport memory (SMM) system reportedly capable of increasing maximum main memory size to four million bytes.

The hardware device allows Modcomp users to extend and connect two or more Model 7860 or 7870 memory buses, according to the firm.

A memory expansion cabinet costs \$15,000 and the memory port interfaces go for \$6,000.

Modcomp can be reached through P.O. Box 6099, 1650 W. McNab Road, Fort Lauderdale, Fla. 33309.

NCR Beefs Up Its 7500 Line

(Continued from Page 39)
counting, the spokesman said.

A keyboard kit that converts the 7520 for use as both a data entry machine and a small business system is available for \$70, he added.

In addition to functioning as a stand-alone system, the 7520 can now communicate with other 7500 systems as well as with members of the NCR 8000 series of computers, via synchronous and bisynchronous communications, the spokesman explained.

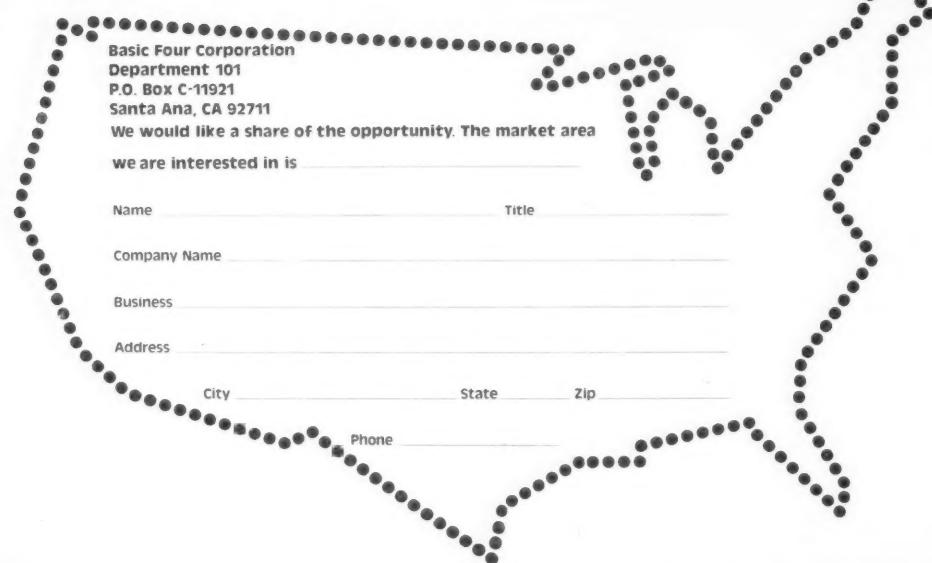
A 12-in. screen is also available for all 7500 models, which previously had 9-in. screens. Besides the 7520, the 7500 series includes the 7510, a cassette-based data entry machine, and the 7530, a media conversion unit that is cassette-based with a floppy disk, magnetic tape and an additional cassette option.

Available as an option this fall will be the "Teach Yourself Basic" course for users with no background in the language. The course is written in Basic and uses the 7520 as a "video teacher."

A typical 7520 small business system includes a microprocessor-based controller with 12-in. screen, keyboard, a dual flexible disk drive that can store half a million bytes, a 132-column 50 line/min. matrix printer and the Basic Plus 6 interpreter.

The purchase price for a typical 7520 system is \$14,355, with rental contracts available. Entry-level 7500 systems begin at \$5,575 with corresponding monthly rentals at \$179 under a three-year contract.

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Peripherals From CDC Aimed at Series/1 Users

(Continued from Page 39)
610 series of CRT stations. The 610-14 station offers a typewriter-style keyboard, numeric pad and extra function keys as an alternative to the data entry keyboard current 610s feature. All 610s display 1,920 characters of data in a 24-line by 80-character format.

The CDC Certainty peripherals are offered to end users of IBM Series/1s on a purchase-only basis, the spokesman stated. In small quantities, the 37.9 million- and 50.6 million-byte models in the 230 series cost \$8,882 and \$9,434, respectively.

The Certainty 240s — each consisting of a 230 plus optional floppy drive — cost \$2,002 more than the correspond-

ing 230s. The 740,000- and 1.48 million-byte fixed-head options cost \$2,904 and \$5,228, respectively, in small quantities.

The new Certainty 450-30 band printer and Certainty 610-14 CRT stations are tagged at \$16,390 and \$2,385.

Ninety-Day Warranty

All Certainty products carry 90-day full service warranties. Maintenance programs are available through CDC's field service organization and the vendor also offers equipment financing plans to Series/1 users through its subsidiary, Commercial Credit Co.

CDC can be contacted through Box O, Minneapolis, Minn. 55440.

Basic/Four System 200 Now Fully Programmable

SANTA ANA, Calif. — Basic/Four Corp. has expanded its System 200 small business computer into a fully programmable system from its original configuration as a bundled, nine-module basic accounting system.

In addition, once maximum expandability of the System 200 has been reached, a user has the option of upgrading to a System 410 at additional cost, a company spokesman said.

The standard configuration of the new System 200 consists of a CPU with 10M bytes of fixed disk storage; 40K bytes of memory, of which 32K bytes is system memory and

8K bytes user memory; one CRT terminal; a 120 char./sec bidirectional printer and a 2.3M-byte magnetic tape cartridge drive.

Disk storage is upgradable to a maximum of 20M bytes in increments of 5M bytes and memory is expandable to 48K and 64K bytes.

A total of two CRTs can be used with the system and options include either a 150 line/min or 160 char./sec printer, the spokesman said.

The basic configuration of the System 200 costs \$24,990. Upgrading to a 410 costs \$11,000.

Basic/Four Corp. can be reached through P.O. Box C-11921, Santa Ana, Calif. 92711.

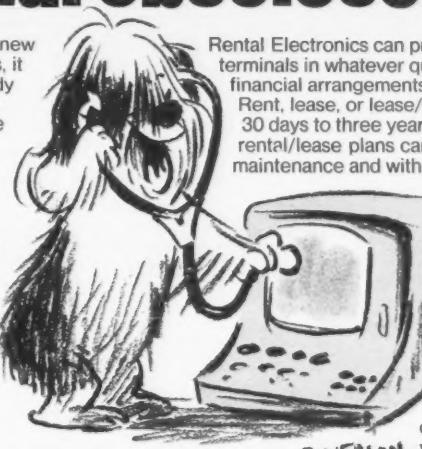
How Rental Electronics helps you avoid terminal obsolescence.

As soon as you take delivery on a new printer or data terminal these days, it seems the next generation is already being announced. Chances are, it has capabilities that begin to make your "new" equipment obsolete. Now, thanks to Rental Electronics, you can have your terminals and highest technology, too.

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If you're interested in more information on renting printers or terminals from Rental Electronics, call one of our local rental centers today.

They're listed opposite. Our on-line computers at every location let us give you price and availability information instantly, while you're still on the phone. In the meantime, check some of our featured rental offers below.

Printers and Data Terminals

Here is a sampling of the printers and data terminals available from Rental Electronics. Call or write today about your specific needs.

TI Model 820 Keyboard Send-Receive Data Terminal/Printer

Printer operates at 150 cps on 9 x 7 wire matrix assembly printhead. Full ASCII Keyboard (ANSI-compatible) with N-key roll over. Operates in Asynchronous, USASCII, RS232C interfaces and is compatible with Bell 103, 113, 202 and 212 units. Selectable baud rates of 110 to 9600.



Hewlett-Packard 2621A/P Terminals

Enhanced 9 x 15 dot character cell, full 128-character ASCII character set in 24 80-character lines. Two pages of continuously scrolling memory. RS232C and Bell 103A compatible. 110 to 9600 baud. 2621/P includes built-in printer operating at 120 cps.



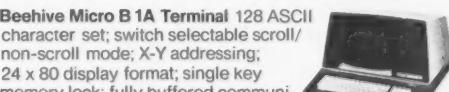
Tally T-2000 Hush-Tone Line Printer

Acoustically designed enclosure. Operates at 125 (Model 2100) and 200 lines/minute (Model 2200) with standard 64 character USASCII. Line spacing switch selectable, 6 or 8 per inch.



ADDS Regent 200 Terminal 24 lines x 80 characters, 25th "status" line shows operating mode. 128 character ASCII. RS232C/CCIT V.24 communications interface operating 75 to 19.2 BPS, switch selectable. Buffered transmission, auxiliary ports.

Beehive Micro B 1A Terminal 128 ASCII character set; switch selectable scroll/non-scroll mode; X-Y addressing; 24 x 80 display format; single key memory lock; fully buffered communications to auxiliary peripheral device.



Lear Siegler ADM-3A Data Entry Display Terminal 12" diagonal, 24-line screen. 64 ASCII characters. Full or half duplex operating modes, switch selectable, baud rates from 75 to 19,200. RS232C interface, 20mA current loop.



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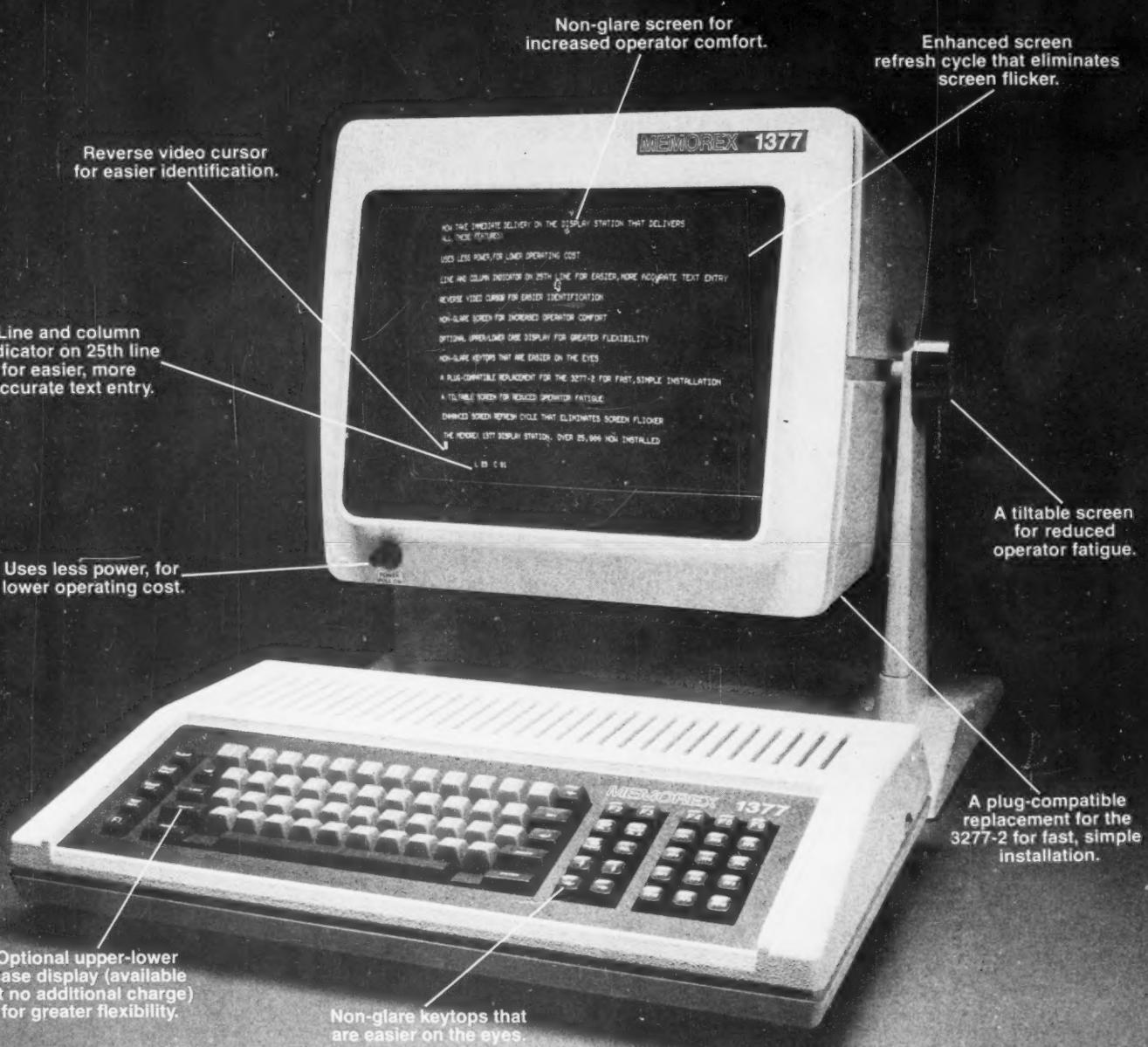
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Identity Crisis — Part 1

Micro Makers Show at NCC and CES

By Jim Edlin
Special to CW

NEW YORK — The dates of the National Computer Conference and the Consumer Electronics Show (CES) may or may not have overlapped in the past. But when they did this year, it had to be the first time anyone cared about it.

The fact that a number of people did care this time is symptomatic of the identity crisis brewing in the microcomputer industry.

The growth and evolution of the microcomputer scene has left people in the industry unsure which of the two trade shows is really the most appropriate place for microcomputerdom to try to do business. The result was that several companies made the extra effort to be present at both events simultaneously.

Most others, either by flipping a coin or by brazening it out, ultimately decided to put all their efforts into one or the other of the two shows. A few apparently decided to pass up both events altogether.

But the breakdown of who went where was not entirely along predictable lines, and that

was only the first of many interesting observations that could be made during several consecutive visits to the microcomputer exhibits at the two shows.

At least 30 companies at CES in Chicago showed products that were related to microcomputers. Of these, 10 also exhibited at NCC.

The 10 were Compucolor Corp., Exidy, Inc., Compumax Associates, Inc., Osborne & Associates, Inc., Commodore Business Machines, Ohio Scientific, Inc., North Star Computers, Inc., Micro Age Wholesale, Inc., CMC Marketing Corp. and Verbatim, Inc.

Apple Computer Co. was not officially present at CES, but had a nearby suite to show its products. Other companies such as Texas Instruments, Inc. and Panasonic Co., were present at both shows but exhibited entirely different lines of merchandise at each event.

The situation was further complicated by NCC's Personal Computing Festival. Some companies, including Compucolor and Ohio Scientific, felt compelled to split their efforts among three booths, one at CES and one

Notable Trends

- Some of the most aggressive pioneers of personal computing began turning their attention — and their heaviest artillery — toward the small business market.
- People who had been in key positions in those pioneering companies are joining new entrants in the industry, spawning a school of hardware look-alikes.
- The "invasion" of the market by offshore manufacturers, predicted and feared by some in the industry, seemed poised to begin.
- The size of the basic "personal" computer unit appeared likely to drop by at least one order of magnitude.
- The promotional rhetoric associated with personal computers seemed to increase by a similar factor.
- Hardware manufacturers have become impressed with the business necessity of having a rich software pool available for their machines, and many began trying to satisfy the need themselves.
- Fertile cross-pollination between microcomputer products and products of other industries is beginning.
- Distributors are beginning to do some of the selling for the manufacturers.
- Word processing and music synthesis have become "hot buttons."
- Communications opportunities for micros are beginning to open.
- Slickness of exhibits is now the rule.

in each part of NCC.

Three companies that had originally entered the market with low-priced personal computer offerings appeared to have decided their new capabilities could be more profitably exploited in the small business arena instead.

Radio Shack introduced its TRS-80 Model II at NCC booths in both the Coliseum and the Personal Computing section. While the product bears a strong

physical resemblance to the original TRS-80, it comes with a built-in, 8-in. disk drive and the ability to add on three more drives. It uses the Level III upgrade of Radio Shack Basic and was shown with strongly business-oriented software. Prices for complete systems range from \$3,000 to \$10,000.

The Pet computer from Commodore Business Machines has (Continued on Page 48)

Program Processes Text On 8080-Based Systems

THOMASTON, Conn. — J. Vilkaitis, Consultants has developed an 8080 microcomputer-based text output processing program that it said is compatible with the Script text processors available on most larger systems.

The program requires an 8080- or Z80-based microcomputer, 16K bytes or more of memory, a printer or hardcopy terminal, a floppy disk drive and CP/M or compatible operating system.

Script 80 supports more than 50 standard Script commands for the combining of multiple files, the formating and right-justifying of text and other functions, the firm noted. The commercial version goes beyond the professional version to support mass mailing techniques for "personalized letters."

The SRC-P80, or professional version, costs \$125; the SRC-C80, or commercial version, with two-year update and mainte-

nance service, costs \$625; and the manual alone costs \$25.

The firm can be reached at P.O. Box 26, High St. Extension, Thomaston, Conn. 06787.

Percom Upgrades TRS-80 Disks

GARLAND, Texas — Percom Data Co., Inc. has introduced software to upgrade the Radio Shack TRS disk operating system and expanded its line of add-on minidisk systems for the TRS-80 to include both 40- and 77-track drives.

The software, called Patch Pak No. 1, is supplied on minidisk and allows the TRS disk operating system to be used with 40- and 77-track minidisk storage systems. The disk operating system was designed for 35-track disk drives.

The firm claimed a "patched" TRS disk operating system elimi-

nates interference from the TRS-80 "heartbeat" pulse in disk operations, as well as most "silent deaths" — the failure of disk drive motors during operation.

Two disk drives are required to apply Patch Pak No. 1. The TRS disk operating system disk is inserted in one drive and the Patch Pak No. 1 minidisk is inserted in the other drive. The Patch Pak No. 1 minidisk and application instructions cost \$19.95.

Expanded Storage Systems

In addition, one-, two- and three-drive systems can be supplied with either 40-track

TFD-100 drives or 77-track TFD-200 drives. This increases disk storage capacity to nearly 205K bytes, compared with 90K bytes for the usual TFD-100.

A 77-track TFD-200 stores up to 197K bytes, while a three-drive system provides 591K bytes of on-line storage. The 77-track minidisks are single-sided, the firm said.

With each disk system, Percom will supply a Patch Pak No. 1 minidisk. Each TFD-100 and TFD-200 unit includes the drive itself, the drive power supply and an enclosure.

The interfacing of disk drives to the TRS-80 is accomplished with the TRS-80 Expansion Interface, which includes controller electronics and a four-drive cable.

The single-drive version of the TFD-100 costs \$399 and the single-drive TFD-200 costs \$675. The two-drive TFD-100 and TFD-200 cost \$795 and \$1,350, respectively, while the three-drive version of the TFD-100 costs \$1,195 and the three drive TFD-200 costs \$2,025.

Percom is at 211 N. Kirby, Garland, Texas 75042.

Exorcisors Get Expandable Memory

WESTLAKE VILLAGE, Calif. — Designed specifically for operation with Motorola Semiconductor Products, Inc.'s Exorcisor, Exorcisor II and MEC evaluation modules, the CI-6800 16K-by-8-bit semiconductor memory system was recently introduced by Chrislin Industries, Inc.

The memory can be expanded to 32K, 48K or 64K by interchanging the 4027 4K- by 1-bit

dynamic memory chip with its 16K equivalent. It is not necessary to modify the board. The CI-6800 memory board plugs directly into existing Exorcisor connectors, the firm said.

The CI-6800 allows maximum processor throughput with the use of on-board hidden refresh control logic. The data access time is 300 nsec and the cycle time is 750 nsec.

On-board memory select is available in 4K increments up to 64K words. A write-disable switch makes the random-access memory appear as read-only memory.

The CI-6800 costs \$390 in 16K-by-8-bit form and \$750 in 64K-by-8-bit form.

Chrislin Industries is at 31352 Via Colinas, Westlake Village, Calif. 91361.

MICROCOMPUTING

For a professional like John Bartlett, there exists a vast wealth of opportunities. To him, finding the challenge has never been the question. It's where that challenge exists. So very much depends on where a family lives; everything that makes up the quality of the lifestyle. When John accepted an offer to manage the Energy & Environment Group of The Analytic Sciences Corporation, it meant a cross-country move to Massachusetts. John and his wife, Helen, have lived in many interesting places. They are both people of remarkable personal resources. What did they find here?

Just ask them.

The electric enthusiasm in Helen's voice sparks the tone of the conversation. "How can I begin?" she says, "Massachusetts . . . the many ways it provides for its people . . . the culture! Our daughters, Tanya and Larah, love the study of dance. Now they can go to classes every week at the Boston School of Ballet. Recreation? You name it! From the Cape Cod beaches to the Berkshires. And the shopping! Boston's Quincy Market, for example! It's a whole world in itself. A whole outdoor marketplace of colorful flowers, music, and

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so much more! You know, out-of-staters don't realize that so many really attractive suburban areas like our own town of Lynnfield are no more than a half hour away from Boston!"

John Bartlett speaks of how the move to Massachusetts has enriched his life. "You could put people into any location in the same job, within four walls — it would be the same. It's what's OUT THERE that's different. For me, the mind-enriching climate of Massachusetts is very real. There's just a mental sharpness that comes into every aspect of living and working here."

"As a living environment, I can't imagine anything better!" Helen continues, "You can grow or you can vegetate. In Massachusetts, you *can't* vegetate, because everywhere you go there is stimulus. I have a degree in math and used to teach full-time. When the children are grown, I can resume my teaching career here, and because of the many excellent educational facilities, I feel I'll have a better opportunity."

"Theater, art, every major league sport and recreational activity you can imagine is available here," John remarks. "And the sense of history here is just pervasive! I don't think you could find a more exciting place for a family to live."

"Massachusetts? It's kind of like looking for fine antiques. There's always life and magic in what you uncover," comments Helen.

John Bartlett and his family have found the life they've been looking

for. They've found Massachusetts to be a remarkable blend of tradition and a vigorous contemporary spirit . . . a vintage of the old and state-of-the-art new.

In John Bartlett's words, "We love it. I wish my peers in other parts of the country could experience Massachusetts."

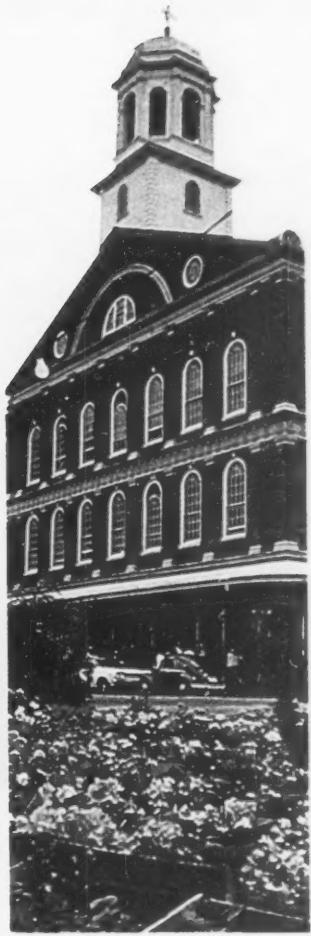
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High-Density CMOS 1K Static RAMs Bow

SANTA CLARA, Calif. — Micro Power Systems, Inc. has introduced a line of 1K static random-access memories (RAM) that have a standby supply current value of only 1 micro A while in the idle or nonswitching state, with a 10 micro A maximum.

The high volume of low-power devices is achieved through use of the high-density CMOS process, the firm said.

The Model MP6508 and Model MP6518 have a 1K- by 1-bit memory configuration, feature a 300 nsec access time, interface with a number of mi-

croprocessors and offer pin compatibility with Intersil, Inc.'s IM6508 and IM6518.

These devices can be used for nonvolatile storage with battery backup. Each device is

powered from a single +5V supply. Inputs and outputs are fully TTL-compatible.

A three-state output and on-chip address registers allow interfacing with micropro-

cessor-based designs, the firm said. The only functional difference between the 16-pin MP6508 and the 18-pin MP6518 is that the inputs are internally connected in the

MP6508, but not in the MP6518.

A typical price in quantities of 100 is \$3.95. Micro Power Systems is at 3100 Alfred St., Santa Clara, Calif. 95050.

Micro Makers Appear at NCC, CES

(Continued from Page 45) metamorphosed into the "CBM" computer (sounds like you-know-who, doesn't it?), and the phrase "professional computer" has replaced "personal computer" on the label. A typewriter-style keyboard is now standard, and the com-

puter was promoted as a system with dual-disk drives and a printer.

A new entrant on the scene was Heath-Schlumberger Data Systems. This company is a very close relative of the Heathkit company, which sells computer kits.

But the new company's featured product is the WH-89 all-in-one computer. It is a terminal-like console that includes CRT, keyboard and disk drive. And it, along with printers and other peripherals, was being positioned very emphatically as a business product.

Underscoring this trend was the presence at CES — where the most expensive offerings recently have been large-screen video projectors running as high as \$4,000 — of two business-oriented micros, being positioned very emphatically as a business product.

One was the Dimension Delta Series 12 computer being represented by CMC Marketing Corp. and described in the promotional literature as a "total business system" starting at \$10,000.

The other was the MAC 500 Complete Business Computer (sic) being displayed by Management Analysis and Control, Inc. It offered an extensive package of business software and included operator training, full warranty and programming and applications seminars for "a monthly cost less than a part-time employee."

Shrinking Sizes

Among the more crowded booths at CES were TI's, where the new Home Computer was being shown, and APF Electronics, Inc.'s, where the "Imagination Machine" was unveiled and where several other new offerings the size of such systems as the Apple and TRS-80 were displayed.

But more startling were the far smaller personal computers that seem to be developing from the hand-held electronic translators.

The translator products themselves are barely a year old, but their makers already seem to have decided their capabilities can be expanded far beyond translating.

At least half a dozen companies including Craig, Quasar, Panasonic, Toshiba, TI and Lexicon Corp. were showing products along the same gen-

eral lines. (The TI product featured synthesized audio as well as spelled-out translation.)

The product descriptions suggested clearly the direction in which product evolution is likely to head in the short term. At the same time, the companies that showed them indicated a strong foothold in the foreign market might be achieved with these products as they evolve into computers.

Panasonic, for example, spoke of its "Hand-Held Computer System." The firm said it "begins a revolution in personal computer technology and marks a new era of information learning and analysis for private use."

All the products of the translator type use plug-in capsule read-only memories (ROM) for program and data base storage. Panasonic's initial offerings will include a Zip Code directory, a diet and nutrition calculator and a weights and measures converter as well as translation capsules.

For the future they promise "entire encyclopedias of information . . . words and graphics . . . displayed right on your home TV screen."

The story is similar for the Quasar Hand-Held Computer (offered by another division of Panasonic's parent, Matsushita). Its "Today" offerings



'I Said I Needed Another DISK Pack.'

Microcomputer Systems, Terminals and Data Communications

MICROCOMPUTER SYSTEMS

Digital: PDT-11/150 Family, PDT-11/130 and PDT-11/110 LSI-11 Based Intelligent Terminals
Digital: PDP 11VO3-L Dual Density Floppy Disk and PDP-11TO3-L 10 MByte Hard Disk Systems, WD-78 and WD-200 Word and Business Data Processing Systems, LSI 11/2 Board and Box Family.

Data General: MP/100 and MP/200 Micronova Floppy Disk and 10 MByte Hard Disk Systems

SOFTWARE

DSM Equalizer™: General Ledger, Payroll, Accounts Payable, Accounts Receivable and Order Entry with Inventory Control
DSM Text Editor: Document Oriented Full Screen Text Editor for LSI-11 Based Family
DSM Speech™: Data Communication Between PDT-11/150, PDP 11VO3-L or PDP 11TO3-L Based Work Stations and IBM, Control Data, Univac or DEC Host Computers

VIDEO TERMINALS

Lear Siegler: ADM-3A, ADM-31, ADM-42
ADDs: Regent 100 and 200
Digital: VT-100
Hazeltine: 1500, 1510, 1520, 1420, 1410, Modular-One
Data General: Dasher 6053 and 6052

PRINTER TERMINALS

Digital: LA-34, LA-120, LA-36, LA-180
Teletype: Model 43 and 40
Qume: Sprint 5 Keyboard and RO
Diablo: 1640, 1650, 1620, 1610
Lear Siegler: 200 and 300 Series 180 CPS
Data General: Dasher 30 and 60 CPS, LP2 180 CPS
Texas Instruments: 743, 745

BAR CODE TERMINALS

Intermec: Alpha-numeric Code 39 and UPC Code RS-232C Readers and Label Printers

GRAPHICS TERMINALS

DSM: 250 by 512 Bit Resolution, Plot 10 Compatible, Vector Generator and Character Display. Terminal Consists of an LSI ADM-3A With an Additional Card.

DATA COMMUNICATIONS AND ACCESSORIES

General Data Comm: Complete Line of FCC Registered Direct Connect Modems including Bell 212A, Compatible Modem, Frequency and Time Division Multiplexers

Micom: Statistical Multiplexers

DSM: Acoustic Couplers and Low Speed Modems

Techtran: Floppy Disk and Data Cassette RS-232C Data Storage Systems

To arrange for an appointment at the DSM showroom nearest you call San Diego 714/560-9222, Orange County 714/540-2312, Los Angeles 213/324-1151, East Los Angeles 213/794-5257, Mountain View 415/941-0240, San Francisco 415/59-1111, Denver 303/573-5133, Englewood (Colorado) 303/770-1972, Salt Lake City 801/487-8281, Albuquerque 505/294-5790, Phoenix 602/265-5216, Seattle 206/827-0402, Portland 503/640-4883, Norman (Oklahoma) 405/364-9803, Pittsburgh 412/487-3654, Haiku Maui 808/575-2930, Main DSM Warehouse 800/532-3717 (California) or 800/854-2684.

Data Systems Marketing
Delivery from Stock

include a thesaurus, bar guide, tax guide and first aid guide. "Tomorrow" they promise "voice synthesis, a printer, large-scale encyclopedic memory, video displays, interconnection to large computers and data recording on tape."

Lexicon Corp. is already offering an RS-232 interface to turn its \$200 translator into a remote terminal by connection to a modem. While all units presently use LED displays, it is likely that they will soon have advanced LCD displays such as the one introduced by Sharp for its new scientific calculators. With this addition, lower-case characters, sub- and superscripts and limited graphics will be possible even on these hand-held units, expanding their appeal considerably.

Next week: More observations on the two shows.

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MIDWAY DEVELOPMENT COMPANY

Miniature Switching Units Connect Peripherals, Modems

PALO ALTO, Calif. — Giltronix, Inc. has introduced four miniature switching units labeled the RS-232-X8K, RS-232-X16K, RS-232-X8 and RS-232-X16.

The units allow users to connect peripherals, modems and CRTs in almost any configuration and, once connected, select or deselect various peripherals, the firm claimed.

More Switching

In addition, the RS-232-X16K and the RS-232-X16 switch 16 EIA pins —

Exidy Sponsors Program Match For Sorcerer

SUNNYVALE, Calif. — Exidy, Inc., the maker of the Sorcerer microcomputer, will sponsor a contest for microcomputer programs this summer. Four Sorcerer computers will be awarded as grand prizes.

The contest is open to all Basic programs that run on the Sorcerer. The purpose of the contest is to encourage people to share their programs, and Exidy plans to publish a book containing the best of them.

Prize Categories

Prizes will be awarded for the best programs in business, education, fun and games and home/personal management.

The contest will run from June 1 to Aug. 31. More information is available from Paul Terrell of Exidy's Marketing Communications Department, 969 W. Maude Ave., Sunnyvale, Calif. 94086.

Correction

World Power Systems in Tucson, Ariz., was inadvertently listed as a dealer of Radio Shack TRS-80-compatible products. Apparently, the firm is no longer in business.



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The Model 772 now makes it possible to use remote conversational terminals for both CPU time-sharing and message communications. Features include originate/answer operating mode, 20 mA current loop and EIA (RS232) terminal interfacing, half or full duplex switchable, data rate in excess of 450 baud (600 baud optional), plus optional hardwire (DAA) line coupling.

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Full-Sized Floppy System Compatible With TRS-80

ALBANY, Calif. — A full-sized floppy disk system compatible with the Radio Shack TRS-80 microcomputer is being offered by Parasitic Engineering.

Called the Maxi-Disk, the Shugart Associates, Inc. 800-based floppy is

compatible with existing TRS-80 drives and can be mixed and matched with the smaller drives, the firm said.

The system plugs into the TRS-80 expansion interface and the user has only to remove the disk controller chip from the expansion interface and replace it with a specially designed circuit board provided by Parasitic. No soldering or trace cutting is necessary.

The expansion interface can also be used as designed, the firm noted.

The Maxi-Disk system sells for \$995 and includes the 8-in. drive, the interface board and a patch to the TRS disk operating system that allows the user to access a variety of drives. Parasitic is at Box 6314, Albany, Calif. 94706.

LTS Handles Extra Energy

SAN GABRIEL, Calif. — Clary Corp. is offering users a line transient suppression package said to be capable of handling large amounts of energy in 5 nsec or less.

The unit features instantaneous response, self-maintenance, plug-in in-

stallation and fail-safe design, the firm said.

Prices for the package, available in 5A, 15A and 30A and 120 and 240 Vac, begin under \$150. Clary Corp. is at 320 W. Clary Ave., San Gabriel, Calif. 91776.

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"Critical manufacturing operations here at Kodak also draw major benefits from a Kodak Komstar microimage processor."

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Eastman Kodak Company

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Check the charts. WANG beats IBM.

IBM recently announced two new computer systems, the IBM 4331 and 4341. We suggest you take a careful look at both of them.

Because that way, you'll appreciate Wang's remarkable VS computer family and the new VS 100 processors that much more.

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Major industry analysts consider Wang's VS systems more advanced than IBM's 4331 and 4341.*

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The VS has a high degree of compatibility with IBM 370 application software—even higher than IBM products like the System 38 and 8100.

	WANG VS	IBM 4331	IBM 4341	WANG VS 100
Price	\$37,000 (512K CPU)	\$65,000 (512K CPU)	\$245,000 (1 MEG CPU)	\$93,000 (1 MEG CPU)
Performance Index	1.0	1.1	3.7	6.0
Comparable IBM System	138	138	148	158
Operating System	Multi-User Interactive	BATCH	BATCH	Multi-User Interactive
System Expandability	DP, WP, TP	DP, TP	DP, TP	DP, WP, TP
Cache Memory	N/A	8K Bytes	8K Bytes	32K Bytes
Memory Range	128K – 512K	512K – 1 MEG	2 MEG – 4 MEG	256K – 2 MEG
On-Line Disk Storage	2.3 Billion Bytes	9 Billion Bytes	18 Billion Bytes	4.6 Billion Bytes
Delivery Date	10 Weeks	1-2 Years	1-2 Years	12 Months

VS interactivity is the highest of any system. That's right, any system.

The VS is extremely easy to use. Any programmer familiar with IBM 370 procedure can become productive in a single day. Even clerks or supervisors with no computer experience become productive within a matter of hours.

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DP92/CW6259

COMPUTERWORLD

Special Report

TRUCKIN' THE SOFTWARE TRAIL

By Don Leavitt



June 25, 1979

Viewed as Tools

Easy-to-Use Systems Meet Rigid Criteria

By Robert F. Hargraves Jr.

Special to CW

As distributed processing becomes more popular, we are likely to hear a great deal more about computer systems that are easy to use. We may also begin to wonder if the term "ease of use" has any meaning. Our experience at DTSS, Inc. in developing an operating system suggests that the term does have meaning, and that fairly rigid criteria can be used to determine if a system meets this new and increasingly important standard of performance.

Ease of use is not, in fact, an obvious attribute of operating systems, nor is it

a characteristic that has been available for a very long time. On the contrary, early systems were notoriously difficult to use, requiring highly trained individuals and separate, specialized departments just to make them function at all.

How do we go about specifying this new and seemingly subjective criterion? First, we should note that ease of use is principally a software-based attribute of a hardware/software system. When software is primitive, it can be said to lack intelligence.

And when it lacks intelligence, the deficit is balanced by human beings

highly trained to coax a computer into doing what it should do. In economic terms, this calls for an investment in trained staff, such as systems programmers, who keep the system running by solving problems on a daily basis.

The hardware itself may change dramatically over time, but the key to building an easy-to-use system is to write software that eliminates those aspects of the system that may be challenging to trained people, but which are highly frustrating to novices. For example, a large mainframe with minimal software and a home computer

with minimal software may be equally frustrating to the inexperienced user, even though the two systems seem to be completely different from one another in every way.

Size or function are of no importance in this instance, because in both cases, the user's experience is determined by software development, or lack of it.

At DTSS, we have long been committed to developing an operating system that can be used by people who are not programmers and, indeed, who are not especially interested in computers. We have focused on people who have a job to do and for whom the computer is a tool rather than an object of fascination.

In most cases, these users are operating from dispersed locations without immediately available support. If they find that it is difficult to do anything with the system, including such simple things as logging in, they don't use it. In our view, people are now looking at a computer the way they would look at a hammer — they want to pick up the tool and use it with minimal problems, or they want another tool.

Making the computer into a simple, usable tool requires that at least five criteria be met:

- Unnecessary parameters should be eliminated. As the capabilities of a sys-

(Continued on SR/8)

Nonapplications: Preparation Vital

By Lem Skidmore

Special to CW

There is no question that nonapplication software packages, properly used, will improve the productivity of any DP organization. Proper use is the key. Specific activities will vary from shop to shop, but three requirements are universal:

- Preparation — human, automated and operational — before the package is installed.

- Education before and after the installation.

- Control, both during installation and throughout the life of the package.

My experience with Roscoe, an online programming tool produced by Applied Data Research, Inc. (ADR), and Easytrieve, a report generator developed by Pansophic Systems, Inc., shows the need for, and success of, an approach that addresses and meets these three requirements.

The experiences differed in that Roscoe's potential impact was considered before installation, while the control of Easytrieve was imposed after installation in an attempt to solve problems. In fact, it was the success of the experience with Roscoe that led to further controls on packages in general; hence, the guidelines for Easytrieve.

When Roscoe was first considered, provisions were made for it in the budget and its installation was accepted as inevitable. The prerequisite for installation was the information of a set of standards and procedures that could be presented to the DP director. We the programming staff were anxious to install Roscoe, but we could not do so without adequate preparation.

Outlining Procedures

Preparation was very important. Procedures for the use of the package had to be outlined, as did procedures for meeting the demands on the testing staff in operations.

At its simplest, Roscoe is a sophisticated keypunch, card reader and line printer disguised as a terminal. The impact of multiple access to the OS job queues was analyzed. This impact was minimized by the use of special classes for jobs submitted from Roscoe.

An incidental benefit was the inclusion of a Job Control Language (JCL) scanner in Roscoe's reader procedure to suppress any unauthorized attempt to access a production file. While not the main reason for procuring Roscoe,

this security was a major selling point in getting the package implemented.

For the use of the package, a set of procedures was published. These procedures, which were directed toward the programming staff, assumed total ignorance of Roscoe. The reader was led from updates of the source library through syntax checks of source code and JCL to verification of compile results followed by testing.

The second and third requirements, education and control, involved less effort. The training staff from ADR

gave a standard introductory lesson, and a staff of approximately 50 programmers and analysts was left to its own devices.

Control in installation was facilitated by the use of a pilot project team of five members, none of whom had had any experience with Roscoe. The documented procedures were thus subject to debugging before publication.

A person in the software support group was assigned to the maintenance of the package, and he was responsible

(Continued on SR/18)

Price Not Only Factor

Winning Package Passes Strict Test

By Darius D. Handrich

Special to CW

WAKEFIELD, Mass. — As software from independent vendors started to proliferate in the early '70s, the technical performance of the packages was often similar. Product evaluation left potential buyers feeling that the only real difference between product "X" and product "Y" was price.

Consequently, many people dug no further and bought solely on the bottom line, only to pay dearly later in maintenance and technical support

costs.

In 1976, we at American Mutual Insurance Co. found ourselves faced with the choice of which program development/text editor software package to buy. Of the four available systems compatible with our IBM 370/145 VS1 environments, three met the company's technical needs.

This left our technical support group with two choices: recommend a system based on its low price or develop criteria other than technical performance on which to evaluate the products.

Since neither price nor time was a constraint, the group opted for the latter approach.

The criteria we eventually developed was the basis for an evaluation not of the product, but of the company behind the product. It is an approach that can be applied to all software and hardware purchases, regardless of the product's technical performance.

Since all the products were technically the same, we had to dig deeper for a reason to endorse one product

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Conventional Wisdom Sabotages Software Buys

By Paul Newton

Special to CW

Conventional techniques for selecting software can lead an organization to choose a package that doesn't address its main needs. The end result is a loss to the user in terms of lost opportunity, wasted resources and inadequate performance. These costs usually far outweigh the original price of the software.

MISTAKE NO. 1 — Write Detailed Specifications of Exactly What a Product Should Do and How It Should Do It.

This is a common practice that we may think of as good business. It may even be required. Usually, however, it severely limits the options available and eliminates products using new concepts.

Specifications are often based on a product with which the writer is familiar or on a "wish list" of features that may leave major problems unaddressed.

A better approach is to draw up a list of the organization's problems, needs and opportunities. Include on the lists items that take up a lot of time or resources, even if you feel that such expenditures are inevitable rather than problematic. Someone may be able to find a way to improve the situation.

A good illustration of the value of this technique is the experience University Computing Co. (UCC) had with its UCC ONE tape management system in 1971. Some companies required a system to generate tape labels automatically. The product concept, now generally accepted, eliminated tape labels and therefore "didn't meet the specs." If a need had been stated — "automatically maintain current data on all tapes and data sets" — or a problem had been listed — "tapes are accidentally destroyed because the external label data hasn't been correctly updated" — the product would have been viewed as ideal.

MISTAKE NO. 2 — Make a Decision Based on a Checklist of Features Outlined in the Product Literature.

A widely run television advertisement uses this technique to prove that the Ford Granada is just like a Mercedes-Benz in looks, interior, quietness, ride and so on. The Ford may be a more affordable product for the average customer, but it is not a Mercedes. After extensive use, anyone would know the difference between the two.

The same is true with software products. Anyone can list features in a brochure. But how do those features work? Will they fit your environment?

Match features with your list of needs and write a brief explanation of how each product feature will solve your problems.

MISTAKE NO. 3 — Avoid Asking Questions That Show Your Ignorance.

The primary rule for good decision making is to refrain from asking questions that make you look smart and start asking those "dumb" questions about things that help you get your job

done well. The important thing to remember is that you know more about your environment than the product vendor.

If you keep referring to your "need list," you are the expert and the vendor's job is to relate his solution to your environment.

If a salesman hits you with product features and technical details, continue to ask him "why" questions until he specifically addresses your needs. If he presents one of those glowing "product concept" pitches, make a list of "how" questions to ask later that will determine how the product usually fits your situation.

If you cannot get a clear answer from the salesman or his support team, make a list to be addressed later.

MISTAKE NO. 4 — Assume That the Product Itself Is The Only Important Thing; Ignore How It Is Sold, Delivered or Supported.

Similar products have different values to you depending on the way the vendor handles them. A mail order product may come with some telephone support but little else. A major product is generally sold by a salesman or sales team that can show you what it does, how it does it and what it means to you.

The sales effort probably includes training and/or installation at your site. It is backed with constant support, continuing improvements and user meetings to make sure you can use the product effectively.

Sales, marketing and support costs several times as much as the original development, but are generally worth it for a product that will be an important part of your environment for many years. If the vendor can't work with you this closely, the product should be directed at less critical or short-term problems and should cost much, much less than a "complete" product package.

MISTAKE NO. 5 — Don't Listen to Other Users of the Product Discuss Their Experiences.

Many people talk to "references" given to them by a salesman; few people really listen to what the users say. Here are some general rules for reference checking:

- Contact not only the references your salesman gives you, but also people from groups like Guide or Share or professional societies.
- Talk to all types of people involved with the product, but include some with job responsibilities similar to yours.
- Start off with "nondirect" questions rather than specific ones. You may find out about advantages or problems you hadn't considered.
- Pay careful attention to what the salesman is "conditioning" you for on the reference calls. Good salesmen generally tell you in advance about problems you'll hear about and explain how they solve or will solve them. Confirm from more neutral sources that those problems really were solved.

MISTAKE NO. 6 — Depend Heavily on the Contract to Make Sure the

Vendor Will Solve Your Needs.

The strongest vendor in the DP business is IBM, and its agreement promises very little. Fly-by-night operations may be willing to commit to anything in a contract, but they can't back it up.

There are two important points here. First, a vendor's general business prac-

ticed with the same success-oriented attitude.

If the product appears to be failing, management should be involved both to ensure that adequate resources are being applied by the user and that the vendor is responding appropriately. If the product can't perform after a fair test like this, don't hesitate to return it.

'The primary rule . . . is to refrain from asking questions that make you look smart and start asking those "dumb" questions about things that help you get your job done well.'

tices and not the language in the contract determine what will usually happen. Ask references if a vendor generally backs up what it says, has a commitment to its marketplace and works with its customers when troubles are encountered.

The second point is that a contract is not better than the remedy it provides. No reasonable vendor will agree to a remedy more extreme than giving your money back. But on a \$30,000 software product, you may invest \$50,000 in resources to implement it or lose a business opportunity worth even more. A good contract is necessary, but is no reason to feel comfortable.

MISTAKE NO. 7 — Select the Product on a Trial Basis or for an Acceptance Period, But Avoid Any Real Commitment of Resources.

This may seem like a reasonable approach, but generally the user isn't able to determine whether the product will really work. Or he may guarantee its failure. The proper approach is to assign good employees and adequate resources to the project.

The implementation team should understand that the goal is to make the product work, not play with it. Every department that will eventually be affected by the product should get in-

MISTAKE NO. 8 — Don't Waste Your Time Training Anyone Except the Person Who Has to Install and Maintain the Product.

Any software product can fail if the end user does not want it or does not understand what it is supposed to do. Don't simply show the end user to fill out forms or read reports. Tell him why the product was selected and how it helps him do his job better.

Sell and train everyone involved. If your vendor has a regular training curriculum and you can use it, do so. But also make sure that you supplement the program with a classroom or on-the-job training effort by your own people.

The techniques suggested here are not unique; they apply to a great many products outside the software area. They do not apply, however, to products that are considered "commodities." Commodities, like foodstuffs or raw materials, are sold in a similar way by many suppliers and can be categorized almost completely by a few parameters such as size, weight, price, color and so on. In this case, many of the "mistakes" outlined here would be proper techniques for making a decision.

Newton is staff vice-president of marketing at University Computing Co. in Dallas.



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Winner Makes Top Grades In Tough User Examination

(Continued from SR/2)
over another. We then chose to evaluate the manufacturer from a support point of view.

The Four Questions

The four questions we asked each vendor were: What kind of marketing and technical support do you offer? How extensive is your documentation? How large is your user base? How many installations do you have that are compatible with a VS1 operating system?

We had four principal sources for our information — the actual vendor, names of users supplied by each vendor, Datapro Research Corp. and articles and advertisements appearing in industry trade journals.

Since we already were using a version of Wylbur on a time-sharing basis through a local service bureau, we wanted the same type of package in order to eliminate the need to retain personnel.

Three Packages

The three packages the Technical Support Group evaluated were Wylbur from On-Line Business Systems, Inc., Super Wylbur from Optimum Systems, Inc. and Mentel from Mentel, Inc.

At the time of the evaluation, we were using On-Line Business Systems' Wylbur. As a packaged system, it was installed at eight locations. Buy only one of them was a VS1 site, and it was in San Francisco. It had only been operational there for one month at the time of the study.

The VS1 package included installation support, five copies of the reference manual, one user's guide and half a day of system programming training. On-Line Business Systems marketing other types of software packages, including ones for resource management, general ledger accounts, reservations and order entry — none of which were of any technical value to an insurance company. The vendor's primary business was computer services, using its own software.

Potential Problem

Optimum Systems had an East Coast branch in Washington, D.C. Super Wylbur was installed at six user sites, but again only one was a VS1 installation.

At the time of our study, the VS1 site, also in San Francisco, had been fully operational for only two months. The user had chosen Super Wylbur because of its enhancements to the original Stanford University system.

Super Wylbur allowed 10 working files instead of just one; numerous restrictions were removed on EXEC files; it had more options on the LIST command; and command names could be specified to user preference.

In checking references, we found a potential problem. Two sources told us Super Wylbur required modifications to be made to the VS1 operating system. We verified this with Optimum Systems and found that it was a modification to the Job Entry System (JES).

The purchase price of the VS1 version of Super Wylbur included three days of training, a reference manual and one year of maintenance.

At the time of the study, Interact had six VS1 installations that had been in operation for 18 months. The nearest VS1 site to us was in Lexington, Mass., and its DP personnel were very pleased with the system.

That user chose Interact because it was easy to install, had IBM 3270 terminal support, required no modifications to the system for VS1 installation and Mental had extensive documentation.

The purchase price of the Interact VS1 version included installation plus a user's guide, reference manual, systems manager's guide, operator's guide, reference card and three days of training.

Mentel did not have any branch offices, but its only business was marketing the on-line program development system.

Weighing Pros, Cons

In September 1977, we were making plans to install our own 370/145 and related software. A decision had to be made to acquire one of the packages.

The choice was difficult. No one company was totally incapable of supporting the American Mutual application. In addition, each product had received relatively strong user endorsements.

From the point of view of list price, Wylbur was better; but, again, price was not a major consideration for us.

From a purely technical view, Super Wylbur, known at the time as the "Cadillac" of Wylbur-type packages, had the edge because of all its enhancements. But many of those enhancements were geared toward text editing rather than program development, and it was the latter that we needed.

In the end, Interact won. All had similar capabilities, but considering the documentation, number of installations and type of company, Mentel was my personal preference. It had the best documentation and sent it voluntarily.

It had the largest number of installed VS1 sites — six of them. The VS1 version had been operational longer than the others, and an Interact VS1 user was 10 minutes away. The final advantage on Mentel's side was that it was strictly a software company, not a service bureau selling Wylbur-type packages on the side.

New Vendor

Interact was installed at our data center in March 1978. It is used primarily as a program development system and secondarily as a data retrieval system against our IDMS data base.

Cullinane Corp. — which markets IDMS — acquired Mentel six months later. If anything, Cullinane improved on what Mentel was already doing better than the competition. The 10-year-old company is headquartered in Wellesley, just 20 minutes from our home office.

Its sole business is developing and marketing software. As such, it can offer the type of support we expect from a supplier — round-the-clock, seven-day-a-week service and regular classes on Interact throughout the year.

Hanrich is technical support manager at American Mutual Insurance Co.

Employees Take Coding Course Handy Report Writer Rescues Insurance Firm

By Bill Pfeifer
Special to CW

PHILADELPHIA — A report writer has become an indispensable programming aid for the DP staff at Fidelity Mutual Life Insurance Co., a medium-sized, service-oriented firm headquartered here. While non-DPers find report writers helpful in preparing reports (avoiding the wait for DP help), our programmers and analysts have also discovered its benefits.

Extracto is more than just another piece of software; it increases our productivity because it is a time saver.

This report writer was originally furnished with an accounting software package purchased from Insurance Systems of America (ISA). The agreement specified that Extracto was to be applied only to the files used by the package. Later, we in DP realized our company needed a report writer.

One of our major requirements was that it had to be easily understood by a non-DP user. Since several members of the accounting department had been writing Extracto requests, we asked them about their reactions. They replied that they had not found it difficult and that it met their objectives.

Another major criterion for a report writer was the ability to read our insurance master file which, because of its huge size, is in a compressed format. As it turned out, Extracto was able to execute our I/O modules to read or write this master file by coding a few parameters to provide linkage to these modules.

We made an attempt to compare Extracto with its competitors and decided it was the most suitable for our environment.

Coding 'Extracto' Requests

The next step was to arrange for ISA to teach representatives of each department how to code Extracto requests. The course took about three days to cover all aspects of Extracto.

We learned that this report writer is a load-and-go program that can handle up to 250 requests on the same input file. It never abends on a data exception and is able to read all types of files including Vsam. Files can be updated or created. The parameters are prepared in an English-like format, and the coding is basically free-form.

One disadvantage is that there is no decimal alignment; the requestor must adjust the results by multiplying or dividing by powers of 10. However, this is necessary only when computing with data defined with different decimal attributes.

Afterward, members of the DP department applied our knowledge to various situations. We executed it to verify our Cobol-generated reports and output files. If test data was needed, it could be built from other existing files and modified to simulate production conditions.

Extracto serves other purposes. Sometimes, a user suddenly needs a custom report on some area of his system for management analysis. There was no easy, quick way to gather the required data, organize it, perform calculations and print it.

It would have taken a clerk considerable time just to scrounge up the facts, not to mention the manual calcula-

tions. Even a programmer writing in Cobol would have to code quite a few lines and then compile, desk check and test the program.

It was easy, however, to write a few

'The course took three days... Afterwards, members of the DP department applied our knowledge to various situations.'

concise parameters in the Extracto language and quickly submit the job.

Another problem that occurred was an inadvertently modified file, in this

case, a transaction history which had already passed through several updates. Obviously, it was too late to reconstruct the files. To compound the problem, it was known that some records were wrong, but there was no established program to correct them.

Extracto demonstrated its strengths by using its update feature to correct the records. And only a few parameters had to be coded, not a cumbersome Cobol program requiring many details.

As we started applying Extracto to check the accuracy of the results of our Cobol programs, some of us became so proficient that we could visualize the next step without a coding pad or the

manual. One of us would just walk over to the nearest keypunch machine and start punching out the next request.

To us, that's the beauty of a free-form language with a few basic parameters. With some other report writers, a format must be rigidly followed which may not be easy to memorize.

Coding Course

Eventually, word spread about the advantages of Extracto in solving certain problems quickly. Because more people wanted to learn how to prepare an Extracto request, we decided to teach a course on its usage. Only this (Continued on SR/21)

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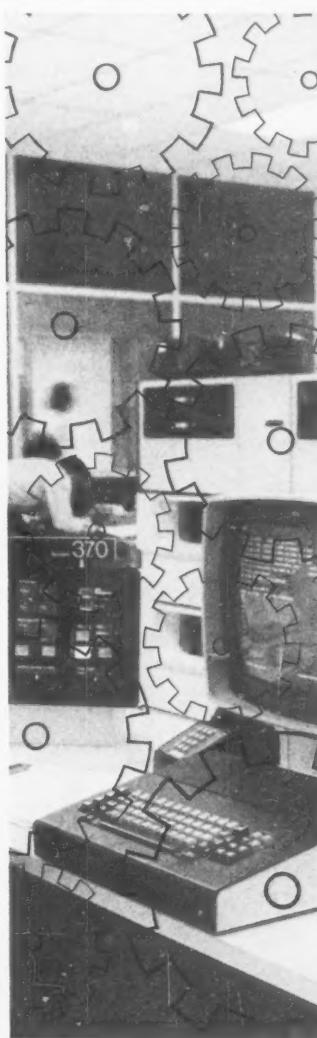
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CW 6/25

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Eight Packages Evaluated

Picking a Disk Space Manager: One User's Tale

By Robert L. Romer

Special to CW

BUTLER, Pa. — American Hardware Supply Co. is a major wholesale supplier of hardware, lumber, building materials and home center products that serves more than 3,300 member dealers in every state east of the Mississippi River.

The home office and warehouse here

and our three branch warehouses depend heavily on our DP facility, currently an IBM 370/148 running DOS/VS.

About a year ago, we decided to install IBM's Advanced Functions — DOS/VSE for 7-partition support, then add proprietary systems software enhancement packages to give us a flexible and powerful system without

going through the expense and agony of a conversion to an OS/VS system. The installation of Space Manager from Altergo Software, Inc. has been our last major step in making our DOS/VSE system look very much like OS/VS, but without the OS overhead.

We currently have 10 spindles of 3350 disk: six in native mode and four in 3330-1 compatibility mode. With five of our seven partitions running batch work, the use of a dedicated pack or partial pack for scratch space for each batch partition was expensive and wasteful.

Our first requirement of a disk space management system was that it optimize the use of scratch disk space by allocating from a "pool" of scratch space, by releasing unused (over-allocated) space and by performing sec-

decks in less than two man-months, and our systems and programming staff learned the use of Space/Manager in less than two days.

There was virtually no training required for the computer operators.

- **Documentation.** Although the initial documentation was computer-printed and lacked the flashy binding used by some other vendors, the quality of the documentation was excellent. The few questions we had after studying the documentation were quickly resolved by calls to Altergo and by the account representative who installed Space/Manager.

- **Vendor support.** This, frankly, was the area that concerned us most about Space/Manager, since it was relatively new in the U.S. and we were to be among the first users in this country.

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'These three packages were all more expensive than the others, but we don't believe a medium to large DOS/VSE installation can afford not to have catalog management.'

ondary space allocation when necessary.

Second, considering the amount of disk storage we have to manage, the number of production disk data sets we have and our current conversion from 3330 to native-mode 3350, it was imperative that the disk space management system contain a comprehensive catalog facility to eliminate the need for manual "mapping" and control of both permanent and temporary disk data sets.

Finally, our system handles an average of about 200,000 B-transient loads in any 24-hour period, so we had to have a disk space management system that required little or no use of the transient area.

Six-Month Evaluation

Over a six-month period, we evaluated eight packages by studying their documentation and by discussing the software with vendor representatives and, in some cases, with users. Most of the packages seemed to satisfy our requirement for management of scratch disk space, but the requirement for a comprehensive catalog management facility quickly eliminated all but Dynam/D from Computer Associates, Reach from SDI and Space/Manager.

These three packages were all more expensive than the others, but we don't believe a medium to large DOS/VSE installation can afford not to have catalog management. The final tie-breaker was our requirement that the software make little or no use of the transient area, which immediately eliminated Dynam/D and Reach and left Space/Manager in a class by itself.

Actually, the final choice of Space/Manager was influenced by several other factors as well:

- **Ease of conversion and use.** Conversion to any disk space manager can be time-consuming and complex, but Space/Manager seemed to be the easiest — throw away ASSGNs and EXTENTs, and add a few simple parameters to the DLBL which are easily learned and make the JCL self-documenting. The technical support staff converted all of our production JCL

Our concern vanished as before, during and after the installation, we found Altergo's support staff to be among the finest we've worked with. Response to calls is immediate.

- **Vsam support.** At the time we made our decision, Space/Manager was the only package that included not only simplified DLBL cards for Vsam, but offered cross-partition access protection at the data set level for Vsam data sets in exactly the same way that SAM, DAM and Isam data sets are protected.

We are heavy users of Vsam, and this feature alone has eliminated the reruns and restarts we used to experience daily.

- **Compatibility with other software.** As mentioned earlier, we are heavily committed to DOS/VSE enhancement packages. We have two initial requirements for any systems software packages: They must not require a permanent change to IBM software, and they must not interfere with other systems software packages we have installed or complicate their use in any way.

Space/Manager passed both of these tests easily and now coexists quite peacefully with the following packages: CA-Sort (Computer Associates); Docs (CFS, Inc.); Epat/VSE (SDI); Flea/Flim, Fags and F-T-L (Goal Systems); the Librarian/VSE and the Librarian/On-Line (Applied Data Research, Inc.).

Romer is senior technical support analyst at American Hardware Supply Co. in Butler, Pa.



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Easy-to-Use Systems Meet Rigid Criteria

(Continued from SR/2)

tem increase, complexity also increases in that there are many more ways the system can perform. These options are parameters of the system.

The best compromise between too many and too few parameters is to have "default values" that have the machine follow a certain pattern 90% of the time for unsophisticated users. These values can then be changed by experienced people to vary the ways in which the machine performs.

- **The system's responses should be clear.** While the computer may not communicate in "real" English, it should use "suggestive" English phrases, with the user having the ability to obtain more or less detail as needed. For example, the system can say "File not saved." This is a clear statement, as compared with the more complex "Error in above specification," which might make sense to a systems programmer, but not to a novice. If the user can then type "Explain saved" or something similar and receive an on-line explanation of the problem, so much the better.

- **Require the minimal number of interactions in order to begin useful work on the machine.** Some systems require up to 10 commands before a user can begin to run an application. Entering that many commands can be an awkward and time-consuming procedure for untrained managers or workers. With a system that is truly easy to use, it should be possible to begin useful work with only two or three commands and, ultimately, with only the log-on command.

- **Write manuals that are readable.** Well-written manuals are a "must" for supporting an easy-to-use computer system. The writer should avoid buzzwords in creating such a manual. He should use simple words and offer many examples. Good indexes and tables of contents are also helpful in guiding less experienced users through the manual.

- **Build a system that is highly reliable.** The user's perception of ease of use is strongly influenced by the system's reliability. The inexperienced user often feels it is hard enough to get the computer to function when it is "up." If the machine goes down often, his frustration level increases.

In addition, recovery from system errors requires a great deal of operator skill in some systems. Therefore, reliability is a key factor in ease of use.

High Rate of Return

While the development of an easy-to-use system calls for a significant investment in software that will do the job, the return is quite high, in terms of benefits to users and to their organizations. These benefits show up in a set of results which can be seen as second-level criteria for an easy-to-use system.

If a company has installed a system and can then observe the following results, this is good evidence that the system is easy to use.

- **Shorter training time.** A truly easy-to-use system should not require extensive training. We have customers who operate large, in-house time-sharing systems with users located around the country. Extensive and expensive training is not cost-effective for these customers, but they are often able to

teach their users to employ the system effectively using nothing more than a manual and telephone conversations with the support team.

- **Smaller support staffs.** By definition, it should be possible to support an easy-to-use system with fewer technical people. This is also an aspect of easy-to-use systems that represents a direct cost savings.

Relatively few technical personnel should be required to assist users in getting their jobs accomplished, even with minimal training. One of our customers, for example, supports more than 1,000 users in 65 separate sites with only three technical people on the staff.

- **Wide range of users.** Another thing to look for is a range of users with

widely different skills on the system and this means both the novice and the sophisticated programmer.

Once the basic system has been designed so that nontechnical people can use it without problems, more sophisticated capabilities can be built on that foundation for people who need a great deal of power. However, it is much more difficult to make a complex system intelligible to the unsophisticated user.

- **Large number of users.** An easy-to-use system should also attract many users because of its accessibility, simplicity and reliability. When we have installed our system in academic institutions, for example, we tend to see more than 90% of the student body and faculty using the system.

Growth is also rapid for in-house time-sharing and commercial service bureau environments. Since a major goal of creating systems which are easy to use is to increase the number of users, the quantity of users is a significant measure of success.

- **Increases in productivity.** The true value of a DP system to a commercial user is increased productivity. Even a system that is difficult to use can, with added effort, raise the productivity of individual workers.

However, an easy-to-use system should raise productivity throughout the company, because of the wide range of users and the large quantity of users.

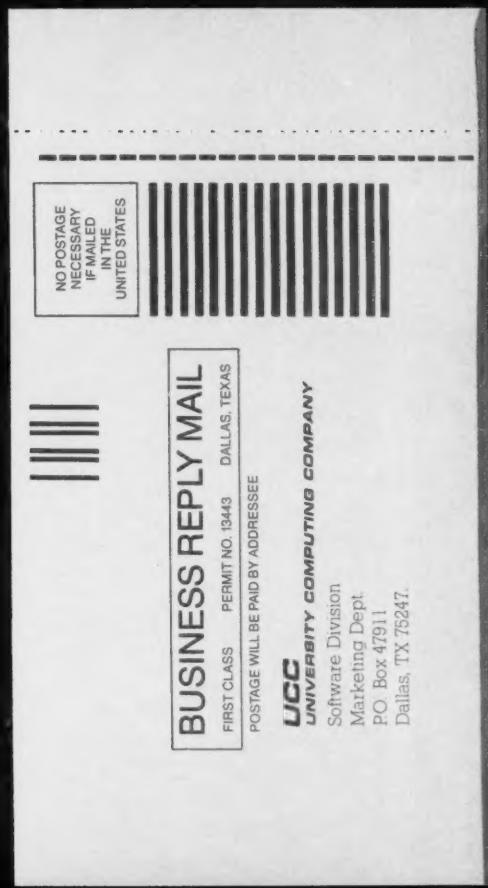
Hargraves is president of DTSS, Inc., in Hanover, N.H.



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Ideas Gathered at Meeting

Users Help Design On-Line Programming Tool

Special to CW

ATLANTA — When a software vendor sets out to develop a useful package, it makes sense to have the people who are going to use the system involved with its initial design.

This approach is particularly critical with emerging technologies such as on-line programming. That is why NCI, Inc. flew some 21 DP professionals to Georgia for an intensive "design meeting," to develop what the company hoped would be the most useful on-line programming tool in the IBM environment.

Fifteen months ago, NCI faced a critical decision. The company's Slick package was gaining popularity as a

program library management system, but IBM was pushing for on-line applications and on-line programming.

Independent library system vendors had begun to market CICS-based programming tools. The NCI choice was to hurry up and create a CICS/Slick interface as the others had done, or create a totally independent on-line programming system. They chose the latter and developed On-line programming Without Limitations (OWL).

For six months, staffers at NCI put down on paper every working feature they could imagine should be in the ultimate on-line programming system — strictly their technical opinion, not based on marketing research, other

people's products or anything else. This effort involved just company experience and an emphasis on what NCI executive vice-president Bruce Forsberg calls "human engineering." They knew this paper system was strictly their idea, but it was a starting place.

Then, NCI put out the challenge to 21 DP people to meet in Atlanta to look at the basic system and to suggest changes that would meet each of their needs. DP managers, Data base administrators, program managers, operations managers, programming people, systems analysts, and applications programmers came from large shops and small shops, with experience in

Westi, Environ/1, Task/Master and CICS, in both OS and DOS and based on a wide variety of library systems. It was an exciting meeting.

On the first day, NCI personnel presented the system they had dreamed up. Then, for two and a half days, the group refined, changed, debated and discussed the refinements. The requests that came from that meeting said that the system should be easy to learn and easy to use. In addition, it should be totally independent of batch program management systems and of any single teleprocessing monitor.

Then the group went home. And NCI began to write code.

Worth the Time

It took almost a year to come up with a working system, but when the NCI people had it, they knew they had taken the right design approach. The non-CICS shops at last could apply advanced on-line programming techniques. And CICS shops were no longer locked into IBM architecture.

Ben Sternlicht is manager of programming and technical support for the Seidman Merchandising Group of Brooklyn, N.Y., a DOS/VS shop dedicated to CICS. Ben was in on the "design meeting."

He went because months of struggling with IBM's SPM had left him only a taste of on-line programming productivity without any results. The NCI meeting was his chance to get results.

"What a challenge it was," Ben said of the meeting. "The basic system NCI presented described ideas far in excess of anything available . . . and that was just the starting point. The right people were there — the people who would use the system."

"And the results were worth it. The OWL is a very smooth system, and everyone here uses it. Most of us haven't even had to read the manual."

Sternlicht claimed that it takes about 15 minutes to train a person in the use of OWL, that it is independent of li-

(Continued on SR/16)

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Software Search Takes Firm Across the Street

By Bill Samole
Special to CW

VAN NUYS, Calif. — A search for software can lead a buyer anywhere in the world. One California company, however, only had to go across the street.

HW Systems, Inc. of 6950 Valjean Ave., right here in Van Nuys, was founded in 1968. For most of its history, it has operated a computer center offering services to the title in-

surance industry. Equipped with two IBM 360/65 computers, it maintains data bases of more than 100 million records for inquiry purposes.

In 1977, management decided to expand into the mini-computer marketplace. Concentrating on the data processing needs of its title insurance clientele, a project team laid out a machine-independent application specification for a title insurance policy prepara-

tion system.

The hardware selection team then reviewed most of the major vendors and chose the Hewlett-Packard Co. 1000. A number of factors led to the decision.

A very high data transfer rate eased concern about the amount of disk activity the application would require. CRT terminals from HP had a variety of desirable built-in features and were program-

mable. HP also had a liberal policy for reproduction of system software. Especially influential was the single vendor support role of HP.

The biggest drawback was the lack of a high-level, general-purpose language for the HP 1000. But the system's hardware virtues were persuasive, and the decision was made to proceed using Fortran as its programming language. In conversation, an indepen-

dent consultant mentioned the nearby presence of another HP OEM. Theta Computer Systems of 6919 Valjean Ave. was using the HP 1000 for turnkey installations.

To produce customer application software efficiently, Theta had developed a high-level compiler totally consistent with HP's system software. The Qbol compiler seemed to include many of the features HW thought it might have to do without on the HP 1000.

At that time, Theta had limited Qbol to its own customers. Alan Gotthelf, president, commented, "Since we were so involved with our users, we underestimated Qbol to a degree. It had led a sheltered life. David Hamilton, the primary designer of Qbol, had certainly not set modest goals."

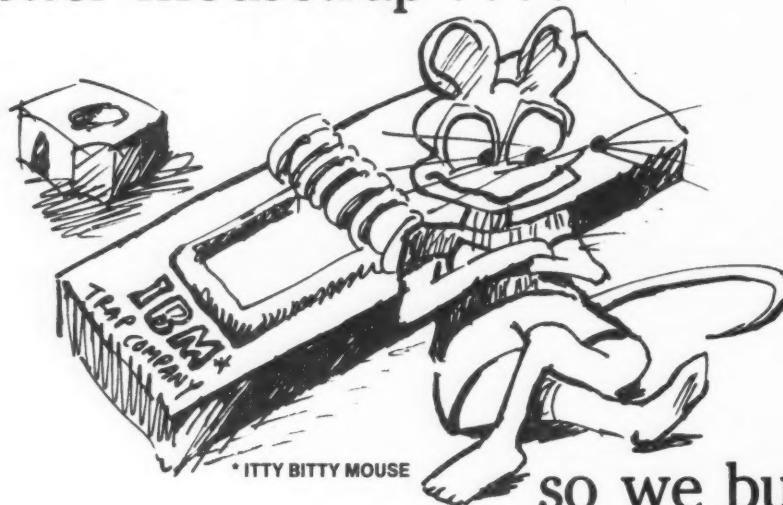
Consisting mainly of text editing and string manipulation commands, HW established a benchmark to compare Qbol to Fortran. As project manager at HW, I coded the Qbol version.

I needed one afternoon with Theta's manual to do my test program. An experienced Fortran programmer took longer to get the same benchmark running. Memory requirements were almost equal.

What impressed HW most was execution times. The Fortran version executed in 3 minutes and 3 seconds while Qbol took 28 seconds.

The sidewalk conferences that used to characterize relations between the two companies are much less frequent; expansion has taken its toll. HW Systems has moved around the corner to 16134 Hart St., and Theta Computer Systems has gone down the Street to 6627 Valjean Ave.

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More Responsive to Users Conversion Smooth, Brings Added Benefits

By Richard A. Holland

Special to CW

HICKSVILLE, N.Y. — The Long Island Lighting (Lilco) is a gas and electric public utility that serves approximately 800,000 customers in the New York counties of Nassau and Suffolk. To support the various activities of the company, the Information Systems Department provides design and programming activities with a staff of 50 people.

The computer center includes two IBM 370s and, until recently, a second-generation IBM 7074.

The 7074 was scheduled to be phased out in 1978 and because of this, we have had to convert a number of second-generation systems to a 370 Cobol environment. One of the largest systems that remained in 7074 Autocoder and 1401 SPS was our Material and Supplies (M&S) and Inventory Control System, comprised of more than 100 second-generation programs.

Documentation of the system was minimal. More than 50 major enhancements requested by user departments could not be incorporated into the system. Maintenance was difficult.

In short, the system was an ideal candidate for conversion/resystematization.

Conversion to 370 Cobol

The Information Systems Department researched the scope of the effort.

Because of a lack of internal resources, we felt that the initial priority would be to convert M&S into 370 ANS Cobol. Once that was accomplished, the outstanding needs of the user would be addressed.

Our estimate for supporting the effort necessary for the development of the ANS Cobol programs to replace the existing M&S programs was 13-1/2 man-years.

Just prior to this time, we had had our first experience with Generation Sciences, Inc., a software consulting firm whose approach to commercial system development differs significantly from anything we had previously dealt with.

Generation Sciences owns a software package, the Generators, that it uses to automatically produce Cobol source programs and supporting documentation. We had used them to convert a small 7074 Autocoder system to 370 Cobol for our Engineering Department.

Their performance was as the company claimed. The Generators pro-

vided the leverage to develop a system, including total documentation, in less time at a lower cost.

Based on this experience, we invited Generation Sciences to study the minimal documentation available and develop a proposal. It proposed a redesign and implementation rather than a straight conversion. The proposal represented one-third of our elapsed time and cost estimate.

The project was initiated with Generation Sciences in February 1977, and the project was completed on schedule for a delivered implementation cost within 3% of the original estimate. This difference was the result of changes requested by us.

Generation Sciences loaded the Generators on Lilco computers and developed the system on-site so that our personnel were able to become familiar with the development of a Generators system from beginning to end.

Highly Successful

The results of the engagement were highly successful. Not only was the vendor able to deliver an extremely complex and critical project on time and on budget, but we now have a newly designed system that is much more responsive to our needs.

As important, we have found that the generated programs are extremely maintainable. Our staff has been able

to implement changes more quickly than heretofore possible on systems developed by traditional methodology.

We have developed and converted many systems, both with Lilco staff and in conjunction with outside vendors. This project, in spite of its complexity and size, was implemented with the least difficulty.

It is generally enough to bring a large development effort in on schedule and within budget. But to be able to do so smoothly and to provide for future enhancements and ease of maintenance is even more significant.

Holland is manager of the Information Systems Department at Long Island Lighting Co., Hicksville, N.Y.

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PRODUCTS FOR PERFORMANCE

Package Meets User's Criteria for Security

By Don Leavitt

CW Staff

WASHINGTON, D.C. — The Washington Computer Center (WCC) of the U.S. Department of Agriculture early last year decided to install a software-based data security system better than the Data Access Security (DAS) package it was then using.

Decision-makers at WCC reasoned that the DP function had become so integrated into the activities of the organizations WCC supports that the loss — or incorrect use — of the function, through unauthorized destruction, disclosed

sure or modification of the data utilized by the WCC, could threaten the organizations' ability to continue their operation.

In its evaluation of available security systems, WCC's Systems Engineering Branch followed a traditional and generally effective procedure. The staffers established acceptance criteria — both mandatory and desirable — and then measured the candidate packages against them.

Several other factors were significant in the WCC study. First of all, the center has large-scale IBM equipment —

a 370/168 running under OS/MVS — so the security software would have to function in that environment.

Beyond that, however, WCC

further, WCC would have to maintain control of the password data set and all accesses to it. This does not allow for ease of use by the end user and

sets were protected, the evaluators noted, explaining that because of the method it uses to determine authorization, RACF was apparently "designed for a nominal amount of protected resources."

There are other flaws in RACF — particularly in terms of user identification procedures — but, the team acknowledged, the shortcomings could be overcome by adding user code at various exits provided by the package.

In contrast to its sharp criticisms of Secure and RACF, the WCC group said ACF2 "provides an easy and efficient method of protecting all data. It does this by default and requires the owner of the data to authorize others to access it."

"The method used to determine if access is to be granted requires only that its data set be opened and read once per job, as opposed to once per data set with Secure and RACF. All users of the system must be identified and authorized by ACF2: users have no option to be identified or not" as they have with RACF.

Because of these capabilities and the way they are executed by ACF2, the team said ACF2 was the only viable alternative of the three packages considered. But the people from WCC recognized one potential problem with ACF2: it was so new the evaluators had "reservations in the area of maintenance and the ability of the company to respond with fixes" in case problems developed.

So they recommended that WCC be allowed to lease the package for the remainder of the then current fiscal year.

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faced another obstacle not usually imposed on nongovernmental installations. It had to handle and protect data in a way that was compliant with the provisions of the Privacy Act of 1974.

During its product survey, WCC developed a 10-point list of criteria. All data (disk and tape) would have to be protected and all users of the system identified and authorized, the evaluators decided. Beyond that, the system would have to allow for decentralization of the security responsibility, they said.

All accesses (successful or unsuccessful) would have to be logged and there would have to be immediate notification of attempted violations to the center's security officer. Ease of use by the end user — who might well be untrained in DP techniques — was still another mandatory feature.

Easy procedures through which passwords, user IDs and access authorities could be changed were also on the list and so was the ability for WCC to use its current data set naming conventions without compromising security. The study group also reasoned that the package should provide protection for program libraries by allowing programs to be executed only and not read.

Finally, WCC required that expected system overhead be "as minimal as possible." Faced with those parameters and several "desirable" capabilities related to TSO usage, the study team chose three products for detailed evaluation: the RACF package from IBM; Secure from Boole & Babbage, Inc.; and the Access Control Facility, ACF2, from Cambridge Systems Group.

Getting down to particulars, the study team said a security system based on data set passwords would not meet WCC's needs. If all data sets were to be protected, such a system would incur an "intolerable amount of overhead." Each data set access would require the password data set to be opened and read to find out if the desired data set was to be accessed, the report said.

there is a built-in delay when passwords are to be changed.

Packages Faulted

With Secure, the study team added, the password is retrieved from the JCL so anytime the password is changed, all JCL that uses the data set must also be changed. Password systems limit their protection to data sets only, whereas WCC's further requirements would include authorization for terminals or any identifiable resource, the report continued.

IBM's RACF, though not based on data set passwords, came a cropper on one of the other criteria. It would incur a "high amount of overhead," estimated to be 1.6% of the WCC 370/168 at peak times, the team said. "Each time a protected data set is accessed, the RACF data set must be read to determine if the requesting user has the proper authority to access the data set."

The RACF overhead would be more evident when all data

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No More Duplications Risk of Mixups Among Jobstreams Reduced

By Don Leavitt
CW Staff

MANCHESTER, N.H. — Flexibility is a word Don Therrian appreciates. He is the manager of management information systems (MIS) at Associated Grocers of New England, and that means systems under his control have to be able to support some 350 stores — large and small — in northern New England.

The wholesaling cooperative has a data center built around an IBM 370/138 running five partitions under DOS/VSE. Therrian makes use of various packages to get his work done, but he seems particularly pleased with a recent acquisition that gives him a lot of OS-like flexibility in his JCL.

The data center is in operation two shifts, five and a half days a week, with three partitions available for batch work, the fourth devoted to CICS and the fifth to Power/VSE. Applications are "very typical," Therrian said, ticking off accounts receivable, general ledger and inventory control as examples.

But he also noted that control of transportation, the scheduling and loading of the trucks that move the groceries to the stores, has a few problems that conventional truck lines, for example, don't face.

Space is limited for holding orders at the warehouse. That means orders have to reach the loading dock more or less at the same time as the truck that will carry them. And the goods generally are heavy enough so that the truck should be packed in the reverse order of delivery — the first delivery should be at the back of the truck.

That means the orders should get to the loading dock in the desired sequence. To make that happen is complicated by the nature of the cooperative itself. Participating stores are free to order what and when they please; there is no overall control that decided what each store should get.

Growing Like Crazy'

Job control was "growing like crazy" with dozens of almost duplicate jobstreams, each servicing a separate store. The risk of confusion continued, Therrian recalled, until he acquired the Job-Manager package from Software Research Corp.

That package allowed his operations people to eliminate duplications and combine the multiple jobstreams into one. Then, at execution time, they used the conditional expansion and conditional execution options available through Job-Manager to change the makeup of the jobstream to fit individual store requirements, Therrian said.

The programming staff at Associated Grocers took about 10 days to get rolling in the use of Job-Manager, but now they are much more aware of what they can do with JCL and look on it as the language it has always been labeled.

At the same time, the operational staff has been relieved of concern for the intricacies of JCL and all its parameters and options. The detail of JCL is "Transparent" to the operations people "and that's probably the way it should be," according to Therrian.

Generally, all the operators have to do now is choose which of several pre-

defined trigger cards are needed to activate or, in some cases, bypass specified procedures.

Asked what was required to help the programming staff understand what Job-Manager could do for them, Therrian said, "The big thing is to get your hands dirty and write a couple of Procs — have them fail or work — and then look at your first success. Once you've done that, the second use is like falling off a log."

Program Testing

The ability to tailor a jobstream to a particular execution has had a very positive impact on program testing at Associated Grocers. The ability to let a

program go against a production file or a test file has meant that testing can go on without any real danger of test program working, perhaps disastrously, against a live and vital production file, the MIS leader continued.

The mechanism used to separate test and production work, and the relevant files, has been used otherwise to help Associated Grocers put some teeth into standardization of various practices and procedures for the programming staff, Therrian added.

He noted also that Job-Manager has been useful in cutting down the number of Source Library Inclusions (SLI) required by the data center. Here again, as with the jobstreams, the

number of SLIs was high, but many were close to being redundant.

Therrian found that SLIs might differ by one card, or an assignment to a different disk or tape drive.

He said the center "had somewhere in the neighborhood of 600 SLIs, and I hope we can eventually bring that down to no more than 250 or 300."

Therrian isn't shy about using packages. In addition to Panvalet, he's also got Boost and Logout from Macro 4, Fleefilm from Coal Systems and CADynam/T from Computer Associates. He's also getting into the use of Computer Associates' CA-Sort, but he clearly sees Job-Manager as a significant addition to his collection.



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Package May Fill the Bill

Deciding on Security Measures No Easy Feat

By Gary Ward

Special to CW

Security. It's no longer a question of if, but rather how soon you need security.

What type of security do you need for your data center? Do you have time to develop your own security? Can a vendor-supplied package meet your requirements?

As a person or group responsible for the security aspects of your DP environment, you must ask yourself these questions in a straightforward and honest evaluation of your security needs.

Everyone has been barraged with seminars, lectures and commentaries on why security is becoming such a necessity in today's DP environment. They talk of compromised data, unauthorized use of valuable machine time, unauthorized time-sharing users, so-called "playful" employees, federal regulations and so on.

But no one has seemed to be able to lay out a few simple guidelines for determining typical security requirements. So let's take a few minutes and attempt to establish a case for security in your shop:

- Do you provide more than one user with DP services? If so, you probably have the potential problem of making sure that each user's data is safely protected from unauthorized access by another user in the environment.

- Do you provide DP services that deal with consumers? If so, then you must provide privacy protection to these accounts in compliance with specific Privacy Act ordinances.

- Are you providing time-sharing or remote job entry service to specific accounts? Are you looking into or running a distributed processing system?

If so, then the ramifications of data security are larger than ever. The data must be protected from destruction and/or compromise from these various independent entities who have access to your machine.

- Does your corporation provide services that are government-related? Laws recently enacted by the federal government are going to require strong security and audit trails as a requirement for doing business.

- Last, but not least, can you be completely certain that your own corporation's data is not being compromised? Do you have security measures to protect your own environment?

Do you completely trust everyone in your organization to have access to your data and machine time on an unlimited basis? If not, then you had better look into security.

How to Proceed

By this time, having answered all the above questions honestly, you know what levels of security you need. Now, the question is how to provide them.

Do you enforce manual standards? Do you develop your own security system?

Do you purchase or lease a security package?

You will agree that manual standards cannot be enforced to a degree that will provide the level of security that technology and legislation are now dictating. That leaves the option of either developing an in-house security system or looking into vendor-supplied packages.

Do It Yourself

First let's look at developing an in-house system. Having laid out the requirements for security, a user can begin to determine how much manpower, machine time and associated costs will be required to create, establish and maintain a security system in his environment.

It is extremely hard to create and establish a security system, but its maintenance will probably far outdistance the other factors in manpower and operating costs. The user must be able to provide migration paths to new releases; must be able to support different requirements each time a new user is added or a new piece of legislation is enacted; and must provide current updated documentation to each area on an ongoing basis to be assured that the system is utilized to the fullest.

After looking into each of these areas, many people will find that they do not have the resources or time to create a security system in-house and continue to maintain it economically.

If so, an existing security product currently being marketed might be a

viable alternative.

Now we have already established our requirements, know what we need and know what our future plans for security are going to be. So all we have to do is pick a security package.

Sound easy? It's not! Choosing the wrong one can cause more grief than you ever thought possible.

First, take a good hard look at the trade journals. Reputable vendors usually advertise in these publications. Get literature on each and every one that sounds feasible. After reviewing the literature, you can probably narrow the field of possibilities down to two or three systems that seem to fill the bill. Contact these vendors and let each one present its product.

Ask questions, dig into the heart of the presentation and make the vendor demonstrate the benefits. After this phase, the choice will probably be narrowed to one or two vendors and their respective products.

It is very important to check references — not just one salesman's list but other users of the vendor's products. Users are the best source of information on the vendor — support, performance, documentation and reliability.

In conclusion, if you are looking into security (and in all probability you are or will be soon), prepare a methodology for evaluating needs. Then follow a consistent path of elimination until you find a security system or package that will provide the ultimate in security at the proper cost/benefit ratio both now and five years from now.

Ward is with Electronic Data Systems Corp. in Dallas.

Users Meet, Help Design On-Line Programming Tool

(Continued from SR/11)

library system commands and, since programmers can store any little personal routines in their own "scratch pad" area, coding of a program is reduced to a minimum... about 15% of the development process.

There is no need for "quick and dirty" report generators. The emphasis in the shop becomes system design, not code-writing.

Major Benefits

"The major features that came out of the meeting were certainly the ease of use of the system and the easy installation. But we also like the ability to move code around between programs without sequence numbers. It's nice to see which code has changed just by looking at the 3270; changed lines are brighter than unchanged ones."

"The toggle-switch feature allows us to split the screen to perform two different functions such as holding one data set while querying another; or to display two similar modules for comparison and so forth."

"We are a small shop with six programmers, but we do all the work for three chains of retail stores and do it well. The OWL system is very much of our answer to productivity," Sternlicht said.

Mike Smith is director of DP at Nor-

stan in Atlanta, where he and four programmers work with a DOS/VIS 370/135 under Environ/1.

"Of course, the major benefit we sought was on-line programming available at last to non-CICS environments. And we got it. The OWL interfaces with just about anything and has all the bells and whistles of every other system," he said.

"It's very easy to program. In terms of time, our greatest savings is in program entry. We just don't wait for printer turnaround any more. In fact, I've just ordered four more tubes to get everyone going with the system."



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Users Voice Opinions on Sort Program Features

Special to CW

Are the special features of a sort/merge program really important to a user? Or are these "bells and whistles" often overshadowed by the pure performance aspects of the program?

In an effort to find out, Whitlow Computer Systems, Inc. recently interviewed a number of users of its Syncsort OS and DOS sort programs, asking each user to evaluate a list of features that are found in both sorts.

"The people we interviewed had originally selected Syncsort primarily on the basis of performance," a Whitlow spokesman said. "But once they became familiar with the sort, they seem to have discovered that the features can make a contribution to overall operating efficiency in several areas."

"Some users have found that features are not only useful in improving programmer productivity, they can also reduce run times in certain situations."

The users interviewed were asked to evaluate and tell how they use three features found in both the OS and DOS versions of Syncsort: INCLUDE/OMIT, which selectively chooses records to be sorted; SUM, which summarizes designated numeric fields on equal records; and OUTREC, which eliminates unneeded data or repositions it for better processing.

A fourth feature — INRECORD, for reformatting records — was not included in the interviews, since it has only gone out to users in the most recent OS release of Syncsort. However, information on this feature was supplied by the vendor from internal tests.

All four of the optional features, which are designed to simplify coding by simulating the most common pre-/post processors, are in the form of simple control statements.

Pat Morgese, systems software manager at the Tandy Co., pointed out that this can be extremely useful to the programmer. "Control statements — unlike separate routines linked to or invoking the sort — need not be compiled, recompiled, debugged or tested," he said. Should there be a coding error, debugging is further simplified by Syncsort's incisive diagnostics and extensive message inventory.

Ed Bradley, senior software analyst at Chesebrough-Pond's, indicated that Syncsort's DOS/OS compatibility with regard to the three features was of major assistance to his installation in a recent DOS to OS conversion.

"We had used the SUM feature heavily in DOS," he said, "and the fact that we could count on it on OS saved us from coding all the addition operations, referencing all the different fields, then compiling, testing and debugging."

This freed the staff to handle the problems proper to the conversion itself, Bradley noted, where INCLUDE/OMIT and OUTREC proved invaluable in implementing the new system. Tandy's DOS to OS conversion was also facilitated by the compatibility of the three features in both systems, Pat Morgese said.

Prescreening Input

Whitlow indicated that INCLUDE/OMIT can be used in any sort to prescreen the input file. INCLUDE specifies the desired subset, while OMIT specifies its complement.

In both cases, the prescreening em-

ploys several clauses linked in Boolean fashion using simple ANDs and ORs. From the user's standpoint, the more input that is screened out, the greater the saving in execution time, and the more complete the screening, the greater the saving in programming time. A single control statement replaces the traditional and more time-consuming programming approach.

Howard Puritz, systems software specialist with the Social Security Administration, estimated that the INCLUDE/OMIT feature was responsible for saving his Cobol installation "a full month of programming time" on a recent project. The need to modify an invoked-sort production program would have required the staff to either rewrite the Cobol program or to write

additional exits."

Puritz also reported two instances where INCLUDE/OMIT saved his high-volume installation three hours of run time in each case.

In the first instance, a production job that usually processes data from seven payment centers was run with INCLUDE/OMIT to process data from only one of the centers, for purposes of a special report.

In the second case, sorting was restricted to a particular class of their five-million-record SMF file.

In neither instance were any changes made to the compiled, working program.

Ted Kropiewnicki, manager of systems programming at Sterling Drug Co., also reported significant savings

in execution time using this option. Dick Dufresne, a senior analyst at Allis-Chalmers, Inc., uses INCLUDE/OMIT to "scan RDWs and weed out short variable-length records to prevent abend processing." The Network Computing Co. reported that a client recently used INCLUDE/OMIT to reduce resources that would be billed to him.

Howard Puritz of Social Security described the third feature, OUTREC, as an "excellent and quick" output record formatter. He noted that reformatted records produced by OUTREC can be used to create another data file, as input to another processing program or as input to a standard report-writer program.

(Continued on SR/21)

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Preparation Vital for Nonapplication Software

(Continued from SR/2)

for disseminating information on new releases of Roscoe and on internally developed enhancements to the package.

The substance of the procedures is not as important as the fact that they existed. The format chosen for the presentation of the installation plan was the company's standard system design document, wherein a project manager and a project leader were assigned. The document was presented to the general managers and the director of DP for approval.

It was the process of definition which impressed management. Roscoe was installed with the knowledge that the organization was prepared for it.

In the case of Easytrieve, the ele-

ments of preparation, education and control had a different meaning. Easytrieve had been in use for more than one year when the need for guidelines for its application became evident.

The problem came to the surface when the programming staff began agitating for any easy means of generating reports in Cobol programs. The report writer feature of Cobol was chosen as the best available technique. This choice raised the question of when to use the report writer and when to use Easytrieve. An analysis of what Easytrieve could do and what it was designed to do was therefore necessary.

Subsequent releases of Easytrieve have provided significant additional facilities, but at the time of the evalua-

tion, the following guidelines for the use of Easytrieve were defined. Easytrieve was to be used only:

- For sequential file input.
- When the instruction set was disposable, or as easy to rewrite as to modify.
- When no table-handling was required.
- When no calculations other than the accumulation of totals at control breaks and associated arithmetic such as figuring averages were required.

Again, the definition was significant. Once a set of guidelines for using Easytrieve was published, the programming staff was free to make a rational analysis of the tools available. The file manipulation power of Cobol coupled with the reporting ease pro-

vided by the report writer feature gave analysts with significant problems a means of producing complex reports for their users.

Conversely, Easytrieve was defined to the point where it became an exceedingly useful tool for simple report generation. No longer did programmers waste time trying to make Easytrieve do a Cobol job and even more time writing Cobol programs to do what Easytrieve was designed to do.

Control and education was handled in the same way for Easytrieve as for Roscoe. Responsibility for the dissemination of information on new features of the package lay in the software area. The fact that both products are very easy to use makes such an arrangement workable. More complex products would probably require a more intensive training arrangement.

The purpose in relating my experience with Roscoe and Easytrieve is not to extol the virtues of the packages, although both are exceptional. The experiences are related to give an example of an organized, purposeful and successful implementation of nonapplication software from two different angles.

Incidental benefits such as improved security with Roscoe and improved programming with Easytrieve were the results of a concerted effort to analyze each package. The efficiency to be gained from preparing for installation is invaluable.

The experiences with Roscoe and Easytrieve led to the formation of a permanent committee on improved programming technologies. All areas of the organization are represented, and the committee is an effective means of communicating information on and analyzing available products.

It is also a vehicle for ensuring that preparation, education and control are a part of the implementation of any nonapplication software product.

Skidmore is a data systems specialist with Southern New England Telephone Co. in New Haven, Conn. His experience with Roscoe and Easytrieve occurred when he was with another employer.

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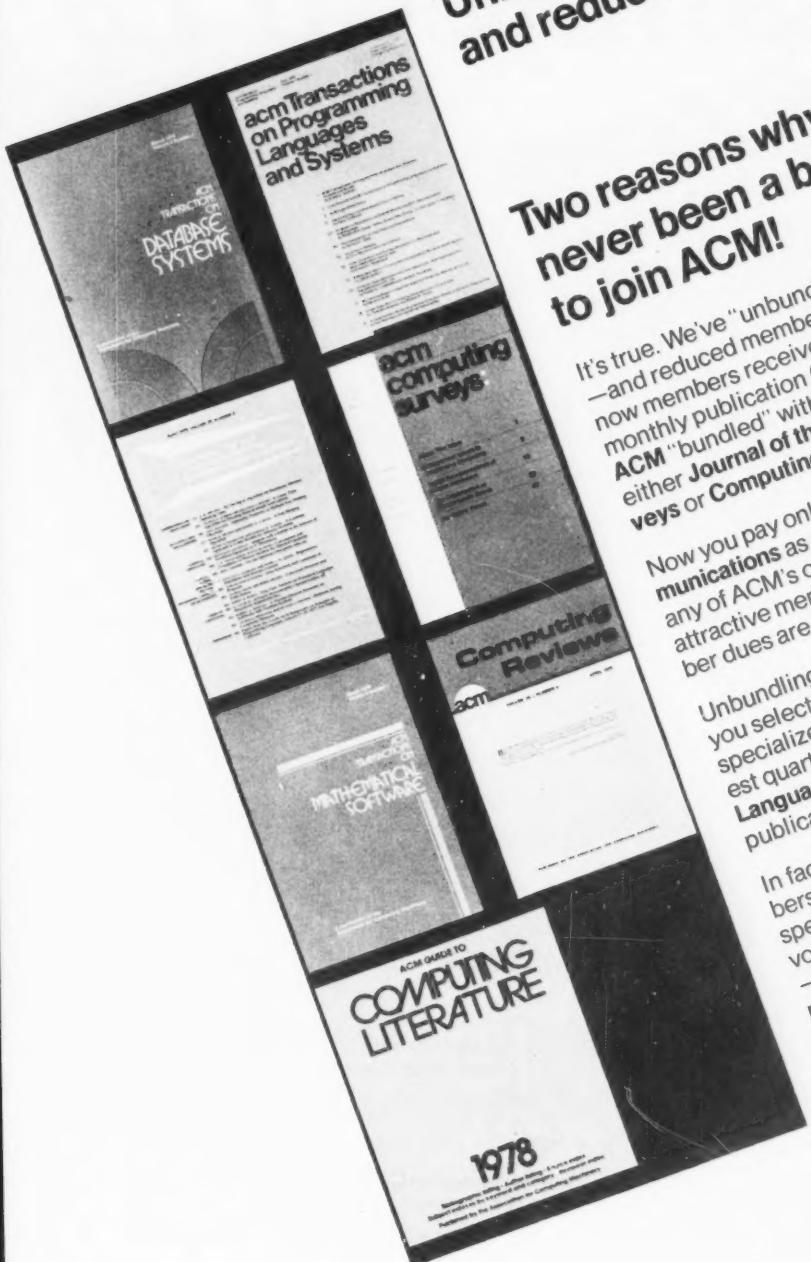
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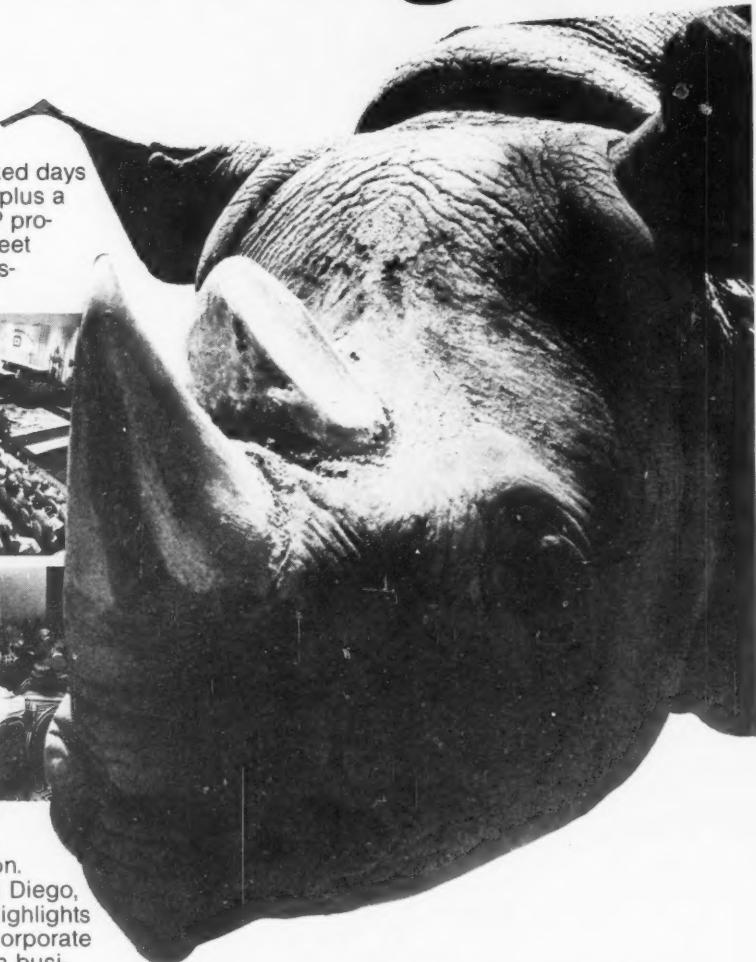
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Users Evaluate Features in Sort Programs

(Continued from SR/17)

Whitlow explained that the SUM option provides a framework for handling equal keyed records encountered during a sort or merge. Only one record is retained in the output file, and the numeric fields specified in the SUM statement are added together.

Bob Johnson, systems engineer at Allendale Insurance Co., stated that in a single day he coded a SUM control statement to process 25 fields per record. "It would have otherwise taken weeks to set up a working program to handle those summations," he said.

Robert Colapietro, operations manager for Information Systems, Inc., said that the SUM option, plus the 20% savings — in some cases more than 50% — he realized on normal sorts, made Syncsort "the most cost-effective software acquisition we've ever made." He noted that SUM, unlike a post processor, will add the indicated fields of equal keyed records as they are encountered during the sort.

"On one insurance detailed run, we reduced an input file of 4-1/2 million records to an output file of 2,000 records, using SUM rather than a separately compiled program written in-house," he said. "This saved us about 40 hours of computer time."

While INREC was not included in the interviews, information on this most recent Syncsort feature, which is included in Syncsort OS Release 2.3, was provided by the vendor: INREC is a control statement that permits the programmer to format — typically to shorten — records as they pass from the input buffer to the storage area.

Thus only those records that survive the INCLUDE/OMIT screening are formatted, and only those parts of the record relevant to the task participate in the sort.

Whitlow claimed that this sorting of only a subset of the characters results in a significant reduction in processing time. The amount of saving is directly related to the comparative size of the original record and reformatted record. In test situations, Whitlow said, improvements of as much as 70% have been realized.

Insurance Firm Rescued

(Continued from SR/5)

time, emphasis was placed on the highlights that would be frequently coded.

This course was about two-and-a-half hours long, and less than two hours was spent on the common mechanics of Extracto. The remaining time was devoted to coding a sample problem and discussing each person's way of solving it.

Because it was anticipated that new employees would be interested in the course and others would need refreshers, the second class was videotaped.

In the course, tips were mentioned from our collective experience on the best way to prepare a certain type of request. It was suggested that a personal notebook be kept containing unusual requests for future reference.

Because learning how to use any software package can be frustrating, everybody is encouraged to apply Extracto often after the course. Only with practice can one be truly fluent in it.

Extracto has been well-received at Fidelity Mutual, especially by programmers and analysts. There are always

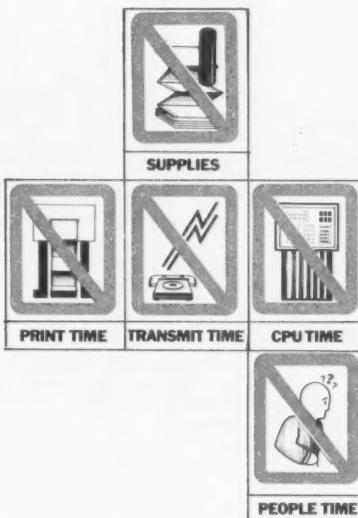
times when we need a quick solution to a pressing problem, and Extracto helps.

Pfeifer is a consulting programmer at Fidelity Mutual. Part of his job is to learn how to use utility software and to pass that information on to the company's 33-member DP staff.

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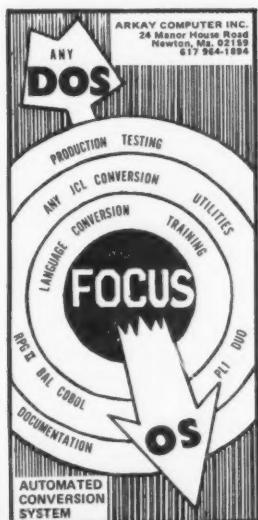
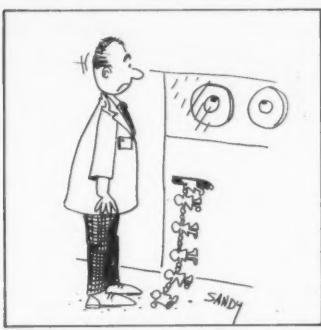
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Problems Corrected in Real Time, Nonscheduled IPLs Down 54.8%

ATLANTA — Southern Co. Services regularly provides electric service to more than 2.5 million residential, commercial and industrial customers in four states. The company's services are used by independent utilities (Georgia, Alabama and Gulf of Mississippi power companies) to handle customer accounting, payroll, construction, engineering, financial and general accounting applications.

To coordinate the busy utility organization's activities, the data center uses an IBM 370/155 under VM/370; and another 155, a 158, a 168 and an Amdahl Corp. 470V/6, all running under OS/MVS. Even with all of this computing power, the Southern Co. Services' data center struggles to keep up with the organization's requirements.

"Our studies showed that IPLs resulting from nonscheduled causes such as system loops, system lockup, reserves on disk and [teleprocessing] problems were averaging 45 per month," Ed McHugh, computer operations supervisor, commented. "It was obvious we needed some method of monitoring our problems and correcting them in real time."

'Resolve': Problem Solver

To solve its problems, Southern Co. Services acquired Resolve from Boole & Babbage, Inc. The organization previously had some "home-grown" on-line, real-time services similar to Resolve when it was operating under OS, but when it converted to SVS, these services were no longer usable. In addition, the work required to convert the old services would have been too expensive and time-consuming.

"We found we had an additional set of problems that our old services wouldn't handle," McHugh noted. "That's why we needed a more powerful operations problem solver."

Resolve, with its 40 services covering productivity, resource management, software recovery and other items, provided the solution.

During the first 30 days of using Resolve, nonscheduled IPLs dropped 54.8%, and many other problem conditions were resolved or identified which resulted in the recovery of computer cycles for additional production processing. McHugh feels that the company achieved from 10% to 30% recovery of resources during this period.

Monitors CPU Distribution

By using the product's CPU measurement facilities, Southern Co. Services' operators

are able to monitor CPU distribution and check for looping jobs. The Reserve service not only helps determine if there was a reserved disk pack but also provides the name of the job that has the reserve.

"It was apparent before we acquired the product that we were losing hardware availability because of problem jobs," McHugh said. "But we didn't know who was using the CPU and tying up our resources. Now, we are able to

never seem to be enough. Our computer operation is the lifeblood of our utilities' daily operations, and users can't afford to have the system slowing down, operating inefficiently or crashing.

"Therefore, anything we can use which helps us quickly analyze system problems, slash IPLs and exit problem jobs benefits everyone at Southern Co. Services and the operating companies."

Since there is no such thing

'It was apparent before we acquired the product that we were losing hardware availability because of problem jobs . . . But we didn't know who was using the CPU and tying up our resources.'

identify problems as they occur so they can be corrected immediately and thus return our computing power to our users."

For example, an operator was processing local and TSO jobs, he noted. On one of the systems there was a noted slowdown in job processing. Service deteriorated so badly that no jobs were allocating steps or processing.

By using the Page service, they found the paging rate for the system was extremely high. The operator and his supervisor were faced with two alternatives: leave TSO users at the priority level or modify them down to a lower priority. By modifying the problem jobs to a lower priority, processing proceeded and didn't inconvenience the TSO users.

McHugh explained that normally the only alternatives available to operations would be to spend time attempting to salvage the system and the work invested by user programmers or re-IPL with dumps that more often than not would pinpoint the real problem.

Job Found in Loop

In another instance, operations was processing a stand-alone job. After reading in two divisions of masterfile, the job appeared to cease processing. After nearly 20 minutes of nonactivity, they monitored the job using Resolve.

It showed that the job was using 20- to 25 seconds of CPU out of 30 seconds, but there was no I/O activity. By finding the job in a loop, they were able to cancel it with a dump and forward the printout to the programmer for correction.

Without Resolve, the job could have looped for an extended period, tying up valuable processing resources.

"Even though we have a lot of computing power," McHugh pointed out, "there

as a "pure" system, McHugh noted that members of his operations staff use Resolve constantly. It enables them to allocate system devices from one system to another in instances where they might not be attainable at that time. It also assists system support with its maintenance tasks and problem determination on the system.

"Even though you have a gut feeling of a problem," McHugh said, "it's difficult to pinpoint the exact program causing the problem. By using Resolve, we avoid needless canceling of jobs which we guess are in problem states."

"That increases our throughput time on jobs, increases job turnaround and speeds up execution time of processing jobs by getting problem jobs out of the system the first time around," he explained.

Resolve paid for itself during the first few months of use just by cutting IPLs in half, McHugh noted.

"I only wish we had purchased the product two years ago when Boole & Babbage first discussed it with us. It would have helped us solve a lot of our problems faster and avoid many lost man-hours."

"Now we carry out our problem solution efforts online and in real time with a lot less effort."



'I'm Taking McCleary Off the Bubble Memory Project.'

Vendor Jobs Kept From Falling Through Cracks

ANAHEIM, Calif. — California Computer Products, Inc. operates an IBM 370/155 Model II under OS/VS1 to support the development, manufacture, sale and servicing of a variety of computer peripherals. The bulk of the company's workload is accounted for in six major systems handling approximately 150 jobs each.

Like schedulers at most other data centers, Calcomp's Tom Hoy relied on his memory to help him prepare the schedule of production jobs to be processed each night. The problem with scheduling that way, of course, is that it is impossible to handle all the combinations of last-minute changes, user requests, special situations and the run-of-the-mill work without occasionally having some jobs "fall through the cracks."

Rex Tompkins, formerly Calcomp's operations manager, understands well the ramifications of scheduling problems. Although the company's problems were certainly infrequent, he was the first to know when one occurred — a frustrated user would usually call him on the phone.

"I began looking around for a system that would provide an operations data base," he remembered. "We didn't have a central master file that could tell us, 'This is what we will have to run today.' I thought a data base of production control information would eliminate problems entirely."

Tompkins looked around, but he considered most of the available systems too expensive. "They have bells and whistles which make them unnecessarily complex for our purposes. I wanted a system I could be sure we'd use effectively on an ongoing basis."

So in April 1978, Tompkins was responsible for selecting The Scheduler from Chronetics. The package offers job scheduling, schedule simulation, on-line tracking and automatic job submission.

Drastic Changes

Norm Andrews, assistant director of Calcomp's data center, said the software is a framework for management control. "I only ask 'Is this job under The Scheduler?' In the past, we'd drop the ball many times."

As people and requirements change — sometimes drastically — The Scheduler makes sure everything stays together. As it turns out, things changed somewhat more drastically than Tompkins anticipated when he acquired the system.

Calcomp, in a major reorganization, divided the users of the data center in two. Since each half runs the same jobs as before, only separately, the workload, in number of jobs, doubled over a weekend. Each system had to be split down the middle.

But according to Andrews, "Even though we doubled the job set-up requirements, we handled it without adding personnel. And if we do hire someone, we'll have added 100% to the workload but only 20% to the production control staff." It took production control only two hours a day for two weeks to prepare the split.

"The Scheduler is of course much better than manual methods, but its real payoff is in the control of the shop," Andrews said. "Its simulation capability, for example, is very effec-

tive. It let us evaluate the impact of the split a month in advance."

"Now we use simulation to predict the time it will take to process a given scheduled workload. Our current machine is fully loaded, but we meet our deadlines because we know what the workload is going to be and what op-

tions are open to us."

Hoy, Calcomp's scheduler, only needs one half hour a day to prepare a schedule. "Trying to schedule even 100 jobs a night in my head was a real problem. The Scheduler makes my job a lot easier. I feel I'm in control."

The number of reruns caused by

scheduling errors — never very high at about five jobs a week — has been reduced to zero. No jobs run out of sequence, a situation which sometimes occurred before. The scheduler's on-line facility tracks scheduled jobs, and sequence enforcement takes place before execution begins.



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Results Go On-Line

County Adds Dimension to Election Reports

By Alan Routhier

Special to CW

SACRAMENTO, Calif. — Twice a year, the County of Sacramento (population 750,000) conducts countywide elections. The contests being voted on range from special district, city and county seats and measures to state and federal offices and statewide propositions (remember Proposition 13?).

Since 1970, the County has been using Datavote, the automated ballot counting system by Diamond International Corp., which uses voter punched cards. In California, the polls close at 8 p.m., at which time we count all the absentee ballots that have been received by election day. Between 9

and 9:30 p.m., we begin counting the ballots as they arrive from the precincts, and we usually finish counting ballots between midnight and 1 a.m.

Until the November 1978 election, the results were reported by printing summary reports periodically throughout the evening, photocopying them and then distributing the copies to the press and public who congregate in the County Administration Building cafeteria.

The time elapsed between commanding the computer to print a summary report and handing out the copies is about 15 to 20 minutes. Precinct reports are printed in precinct order after the ballots are counted.

Since the press wants to report up-to-date election results over the airwaves on election night, we thought we would supplement our normal election reporting with results displayed on a CRT terminal. It wasn't difficult to write the display program using the Complete teleprocessing monitor from Software AG.

The Datavote system keeps individual precinct and cumulative summary results on a preformatted Indexed Sequential Access Method (Isam) file which is updated each time a precinct is successfully counted. It also provides an interface routine that reads the Isam file (keyed on precinct number with a special key for summary re-

sults) and presents the results in three different formats.

Therefore, all the program needs to do is control the conversation with the terminal operator and place the data in the desired format on the screen.

Three Terminals Placed

On election night, we placed a CRT terminal operated by a trained clerk in the cafeteria with the press and public. We also placed two terminals in private offices where clerks answer incoming phone calls and also report results to the Secretary of State's office.

We knew the terminals would be interesting as a novelty at least, but we were unsure how much practical use would be made of them. People were accustomed to the summary reports which report all contests (72 of them for this election); the terminals display one contest at a time. However, the results on the terminal are literally up-to-the-second as the precincts are counted, and response time is fast (one to two seconds on local IBM 3270-type terminals).

As the evening wore on, we were pleasantly surprised to see how the terminals were used. As usual, a few of the contests drew most of the interest, while the others were, for the most part, ignored. And to those people watching these contests in the cafeteria, they were as exciting as horse races.

Once they realized how current the results were, people (especially reporters) were stacked three deep around the terminal to watch the results as they changed with each flash of the screen. The terminal operator was able to display everyone's request since people were mainly interested in a small subset of all the contests.

Similarly, when people discovered that precinct results were available at the terminal, key precincts were displayed to help predict the winners in certain contests. People also enjoyed seeing how their own precincts voted on various issues.

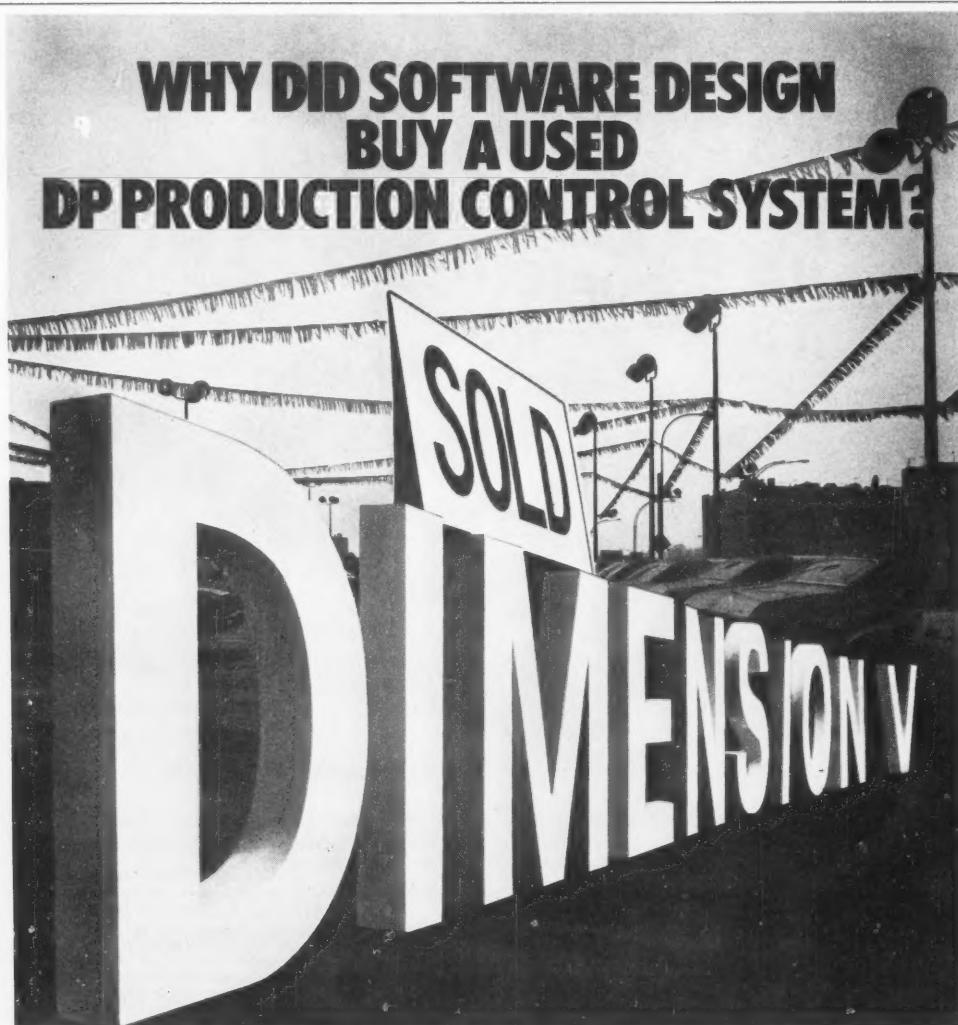
One contest for a county supervisor's seat was especially interesting because the two top candidates were very close. They changed places several times during the evening before one candidate finally pulled ahead at the end of the count.

The people handling phone calls also found that the CRT terminals were more convenient to use than the listings and that the people to whom they talked appreciated the fact that the results were current. The printed reports which still appeared every half hour satisfied most people's curiosity about the remainder of the election.

As a result of this experiment, on-line election results will be a permanent feature at the County of Sacramento in the future.

Because of the nature of elections and the publicity they generate, our simple application helped promote the use of on-line systems in the county. The cost was very low; less than one man-month was spent designing and programming it, and we used terminals that were normally used by our staff for on-line program developments.

Routhier is a systems analyst/programmer with the County of Sacramento, Calif.



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Package Lets User Hasten Program Conversion

By Don Leavitt
CW Staff

RENTON, Wash. — Tom Motheral of SHR, Inc. has a reasonable understanding of what computers can do for him, and how to make them do it. But he's also glad to have found a utility package that "shifts the emphasis from the machine and its peculiarities to the user and the job he wants done."

His interest in the Speed system development/data base support package, from The Office Manager, Inc., came about when Motheral had to shift a personnel system he had built in APL on a commercial time-sharing system to Basic on an in-house Wang Laboratories, Inc. 2200VS minicomputer.

"I am more concerned with meeting the needs of a particular market than with developing my skills in Basic. My first level of expertise is in employee relations. I know enough about computers to create solutions to problems in this field."

"But," he continued, "additional knowledge in the computer field could only be gained at the expense of keeping current in my primary profession. Speed helps keep the balance in the right direction."

Motheral wasn't displeased with his APL implementation and he was clearly gratified that much of the overall concept of the earlier system could be carried over to the new environment. On the other hand, he also saw that the "far greater flexibility of the 2200 encouraged vast improvements, particularly in the man-machine interface area."

Speed's contribution to this conversion was "substantial," according to Motheral, who noted that much of the system was straightforward and Speed's conventions "were more than adequate to create files and data entry programs without my writing a single line of code."

Limited Coding Demands

In those areas where he had to go beyond Speed's capabilities, he found there were procedures available that limited his need to write code to a "bare minimum." Special case exists were among the procedures he had in mind: they let him leave the utility logic to deal with a peculiar problem in Assembler code and then return immediately to Speed's control.

There was one instance he recalled in which he had to create a unique input subsystem. Even there, Speed's contribution was "significant." As he explained the situation, "a useful library of subroutines can be called to

perform such tedious and mundane tasks as opening and closing files, retrieving and storing records and displaying error messages.

"When finished, this subsystem dovetailed neatly with the rest of the system in spite of the fact that it was written outside of the Speed set of conventions."

Touching on other points, Motheral said report writing with Speed is a "relatively

simple task." The associated sort program provides up to seven field sorts and the ability to set upper and lower data limits on those fields.

The report program itself can be little more than formatting statements or, if more is needed, it can involve the assembly of data from many files and the calculation of values before printing. In common with many reporting systems, such things as head-

ings, subheadings, subtotals and totals are handled by Speed.

Documentation is well provided by Speed, according to Motheral. File parameters and complete field description reports are printed upon request and screen display reports are also available, he noted, adding "the systems analyst is left with little more to prepare than a system flowchart and appropriate remarks embed-

ded in the Basic code."

Modifications are handled "nicely" by Speed utilities, he said. "I have had to make several file changes where actual experience has proven some of my original design assumptions were wrong. For instance, the addition of a new data element to a record is a relatively simple task, leaving the programmer with little more than the work of modifying his own Basic code."

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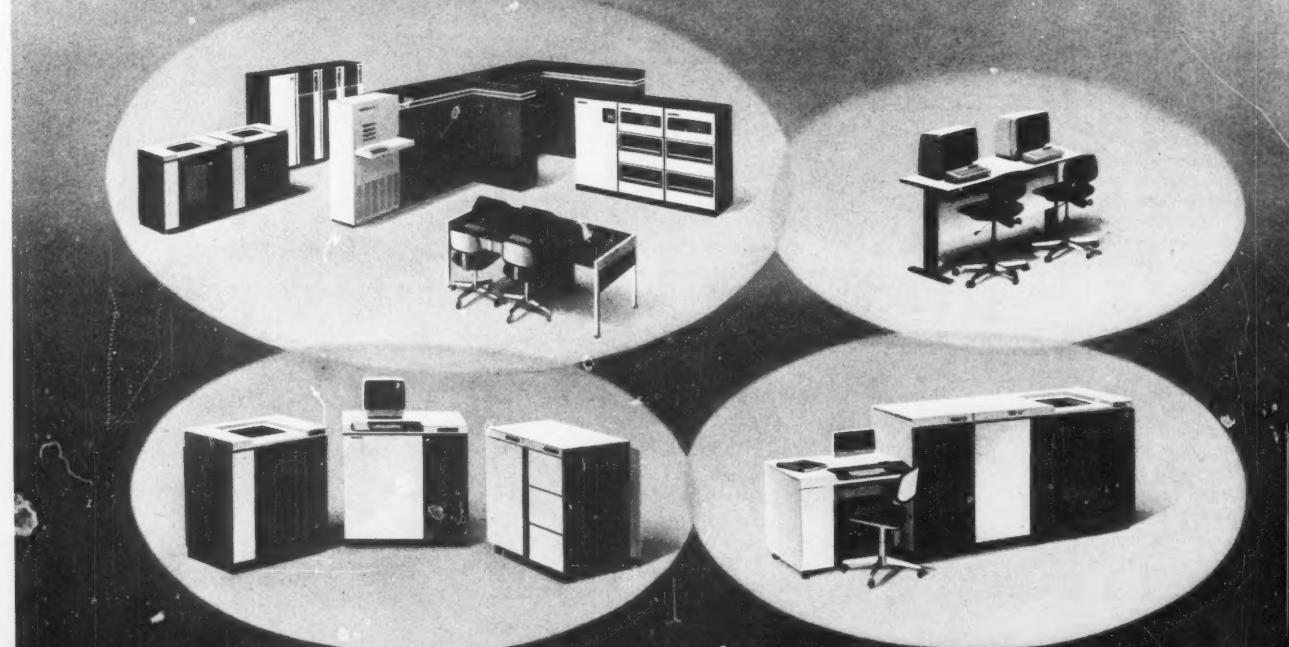
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FACING UP TO CONVERSION

Part IV

BY BENJAMIN E. McMILLAN

There is such a variety of computers and system configurations to choose from that selecting a computer system today is a monumental task.

Even with the design of the system and definition of tasks set forth in a feasibility study, advance planning eliminates only that portion of the task that can be eliminated easily anyway.

Once the objectives have been defined, it is necessary to select the best system to attain them. This task is difficult not only because of the large variety of systems available and the complexity of the computer itself, but because there can be an almost infinite number of combinations and possible mixes of equipment or tasks to be performed. It would require a full-time staff to study all models and makes of available equipment.

There are many approaches to this dilemma. Some companies rely upon the assistance of computer manufacturers to help them through the maze of systems. Other companies rely on outside consultants.

Help From Configurations

In addition, computer programs called "configurators" may be used to help select the necessary system. Configurators use a method of job simulation based on a series of models of tasks the user has specified. The program considers all the characteristics of the job stream to establish a particular demand on the system.

After the computations are comple-

ted, the results are printed and indicate to the system user whether all the system resources in the specifications were being utilized efficiently. If not, the configuration program is run again and the system user enters his new specifications.

This process continues until a satisfactory system design has been established and the proper equipment selected.

Configurator programs can help companies that lack the proper in-house talent, but they still have some obvious drawbacks. Very few configurators are available today, and these are restricted by manufacturers to in-house use. They can help only a very large company with sufficient funds to cover the costs. In addition, their use is limited to system identification rather than selection.

Brocato Method

One notable method of system selection was developed by Louis J. Brocato, a staff specialist in charge of computer procurement for the U.S. Department of Agriculture. Developed for his Master of Science thesis at the University of Maryland, Brocato's method consists of nine steps and provides a means of evaluating the vendor's proposals very efficiently.

The following material is an abbreviated version of Brocato's method and was taken from "Getting the Best Computer System for Your Money" [Computer Decisions, September 1971].

- The key to an orderly evaluation of vendors' responses is a master list of system capabilities, covering hardware, software, expandability, general support and vendor experience (see box). If it is complete and if all the items contained in it are followed, a system of any size and complexity can be selected with a high degree of confidence.

In this last installment of the series, McMillan discusses the particulars of system selection and implementation.

dence in the evaluation.

If any item on the list is not desirable, or if it is completely irrelevant to the proposed system, a value of zero can be given to it. Once the user has a list of system capabilities, he can start evaluating vendors' responses, using the following procedure:

- Select those sections of hardware and software in the list that are absolutely mandatory and require them to be supplied without variation. Any vendor that cannot supply a mandatory item would be automatically eliminated from consideration.
- Take those items that are mandatory and included and give them a percentage weight proportional to their weight of importance to the system.

For example, let's say a line printer has a weight of 20% in the proposed system.

Next, let's consider individual features of the printer and assign weights to each. In this case, we would consider and weigh such features as speed, ease of loading paper, size of character type, ease of changing the character set and so forth.

A line printer which is to be used to produce technical reports in a form adequate for use in a technical journal must also provide an expanded or special character set.

With this information, we can assign weights for evaluation of different line printers as follows: printer's speed based upon a desirable speed of 1,200 line/min, 30%; reliability, 5%; size of character set, 5%; ease of loading paper, 5%; requirement for making fine adjustments and ease of making them, 5%; operator dependence required for efficient operation, 5%; quality of print, 25%; ease of changing the character set, 20%.

When these calculations have been completed, the point score of the line printer will be added to other mandatory elements of the system.

- List all items which are desirable but not mandatory, giving each item a percentage weight which also would be related to its weight of importance to the total system. For example, paper tape equipment may not be required, but may be desirable if the system is to interface to teletypewriters.

(Continued on Page 52)

FACING UP TO CONVERSION IN DEPTH

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- Make an independent evaluation based upon the information in the vendor's proposal relating to how his system will meet all your requirements as specified. Each item should be evaluated independently by one or more individuals who are knowledgeable in that area.

Aids in Evaluation

It is suggested that the individuals who are performing this evaluation be unaware of the percentage weight that has been assigned to the item they are evaluating. This way, they are not prejudiced by its relative importance.

The evaluation should be based upon careful examination of all vendors' manuals which are pertinent to the total system, technical presentations by each vendor interested in bidding on the system, follow-up technical discussions with experts from the vendor's office and personal visits by the evaluation team to at least two installations that have identical or very similar systems to the one that is being proposed. These visits should include discussions with the users and operators.

Although it is not mandatory, a visit to the corporate headquarters of each vendor will help considerably in determining the vendor's future plans and philosophies.

Total Cost

- Add up the costs of the proposed system including all extra costs such as training, service, maintenance and documentation. If the system is to be leased, we suggest that all one-time costs be totaled and divided by the expected life of the system and then added to the lease cost.

As an example, if the system is ex-

- ## Hardware
- ### Central Processor
- Instruction set and special features (flexibility and power of the instruction set, availability and flexibility of the decimal instruction set, ease of bit manipulation).
 - Addressing (amount of directly addressable core, virtual memory, indirect addressing).
 - Double-precision arithmetic functions.
 - Availability of storage-to-storage, storage-to-register and register-to-register instructions.
 - Fetch time and cycle time.
 - Size (words in memory, word size).
 - Input/output (channel speed, spooling, number of channels, symbionts such as Hasp, channel overlap).
 - Operator dependence (requirements for operator intervention, set-up time).
 - Registers (general registers, index registers, floating point registers, several complete sets of registers).

Peripherals

 - Direct-access storage (transfer rate, speed of access, maximum storage size, ease of changing storage elements).
 - Mass storage (transfer rate, speed of access, maximum storage size).
 - Magnetic tape (speed, density, number of units, number of tracks, operator dependence).
 - Paper tape (speed, ease of loading, operator dependence, number of tape levels, tape width).
 - Card punch (speed, number of stackers, operator dependence).
 - Card reader (speed, ease of operation, operator dependence).
 - Printer (speed, character set, ease of loading paper, fine adjustments, operator dependence, quality of print, ease of changing character set).
 - Communications equipment (speed, number of possible terminals, error rate, error-detection techniques, error-correction techniques).
 - CRT terminal (speed, buffer size, remote distance without communications drivers, character set, resolution, number of terminals, ease of operation, quality of the display, brightness, color, persistence).
 - Optical character reader (speed, ease of operation, operator dependence).
 - Magnetic character reader (speed, operator dependence, ease of operation).
 - Incremental plotter (on-line speed, off-line speed to generate plotter tape, throughput speed, ease of operation, operator dependence).

Nonstandard Interfaces

 - Priority interrupts (hardware servicing, software servicing, speed of service, availability of priority levels).
 - Parallel input (number of parallel input terminals, built-in multiplexing, speed of service).
 - Parallel output (number of terminals, multiplexing, speed of service).
 - Control pulses (availability, decode requirements).
 - Clocks (availability, real-time, access by user).

pected to last five years, all one-time costs should be divided by five and added to the annual lease rate to obtain

the effective cost of the system. Examples of one-time costs are: initial training, installation of communications lines, special hookups to lab equipment for scientific data collection and converting important programs for compatibility purposes.

- Multiply each item's percentage weight by the score that has been de-

termined by the evaluation team (the total percentage points awarded the item) in order to find a point score based upon the technical evaluation. Add this score to the score for the other items in the system and divide by the effective cost to find a value-per-dollar figure.

- Having tentatively selected the



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IN DEPTH

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- General support programming (job control language, procedure library, function library, utility programs, assembler, Fortran compiler, Cobol compiler, Algol compiler, various other compilers, linkage editor).

Application languages

- Assembly language (execution times, ease of programming, ease of debugging).
- Fortran (level, special features, diagnostics).
- Cobol (level, special features, diagnostics).
- Other user-level languages (report generation, sort/merge, Basic, linear programming, simulation, Algol, etc.).
- Real-time (language, interrupt servicing).
- Time-sharing (software servicing).
- Communications (software servicing).
- Compatibility (with existing system, reprogramming requirements, retraining requirements).

Expandability

- Core (availability, addressability, size, ease of modification).
- Mass storage (maximum size, speed, ease of addition, access time).
- Software (ease of modification of software to support hardware expansions).
- CPU.

General Support

- Periodic maintenance (frequency, time required).
- Emergency service (hours available, location of service center, availability of service personnel, response time to service request).
- Documentation (clarity, how extensive, availability of manuals).
- Initial training (where given, how extensive, limit on personnel).
- Future training (where given, how extensive, limit on personnel).
- Availability of systems assistance.
- Availability of local backup computer (at least for batch work).
- Availability and vendor support of common user groups.
- Responsiveness of vendor to technical questions concerning the evaluation (both the timeliness and accuracy of the response should be considered here and this should be a fairly high percentage weighted item in the evaluation).

- Real-time data acquisition.
- Remote batch.
- Telecommunications.
- Multiprocessing.

Experience of the Vendor

- Time-sharing.
- Local batch.
- Multiprogramming.
- Simulation.

The list on these two pages, compiled by Louis J. Brocato in "Getting the Best Computer System for Your Money," can be used to select a system of any size or complexity. Use it to note mandatory items, analyze the weight of the features of an item or to weigh desirable items and features.

"best system," invite its vendor to benchmark it to analyze its performance. This should be done in an environment either identical to or closely simulating that which will be used in the final configuration. Only the best system runs a benchmark.

The procedure is quite different from the normal procedure whereby all vendors are invited to perform a benchmark and this benchmark is part of the evaluation.

This is very costly both to the vendors and to the installation doing the evaluation. It is also a great waste of time, sometimes causing delays in excess of 18 months in order to perform an adequate evaluation with the required benchmarks.

Using this technique, a system is tentatively selected based on an evaluation of the system. Then, only the one that is tentatively selected is required to do a benchmark. It should be emphasized here that the benchmark is not to measure throughput but rather to validate the manufacturer's claims.

If the benchmark proves successful, the system is officially selected for installation. If the benchmark proves unsuccessful, the second system based on the value per dollar is selected for

(Continued on Page 56)

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FACING UP TO CONVERSION

IN DEPTH

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(Continued from Page 53)
benchmark and evaluated for possible contract award and installation.

Implementing Changes

The method used for implementation, the final phase of conversion, depends on the extent of the changes that are being made. If the conversion is a major upgrade to a new system or a

new vendor, it is possible to make parallel runs during the changeover.

Joseph Orlicky, writing in *The Successful Computer System*, described four basic methods of implementation: running parallel systems, running a pilot system, instituting a phase-in/phase-out procedure and taking the "burned bridges" approach.

Running the old and new systems in parallel offers maximum security and is best for important daily jobs such as payroll. Because the new system has to have exactly the same type of output as the old, the results of the new system can be checked. The disadvantage of this method is the personnel requirements while both systems are running simultaneously.

The second method, running a pilot system, is very practical because it offers less strain on the operational staff but still allows a method of parallel operation.

However, with this method, not enough of the system can be tested before the old system is terminated. Some tasks cannot be processed until the new system has been implemented.

The third method, the phase-in/phase-out system, has been very effective for many users. The old system is gradually phased out while the new one is phased in. This offers a degree of security in that most of the tasks

may be tested and, if necessary, corrected on the new system before the old system is totally phased out.

Last, but not least, is the method that requires the most planning but the least time to implement. If it is necessary to convert during a holiday weekend, or even overnight, this "burned bridges" approach will probably have to be used.

This method places a great deal of pressure on the involved system staff to do a good job on the new system.

This option may get better results, but with the complexity of most systems today, the chances for failure are high.

If the conversion is a new operation or new equipment is added to increase the capacity, it will have to be implemented on weekends or holidays.

Of course, the complexity of the change must be considered during early stages of the planning process, and detailed planning is necessary to formulate the proper implementation schedules.

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Benjamin E. McMillan is a specialist in computer systems acquisition for General Dynamics Corp. in St. Louis. His work involves identifying opportunities for standardization and multi-site utilization and volume purchase and/or lease arrangements for equipment, materials and supplies for computer centers. He investigates new equipment and supplies as they reach the market and arranges to test, evaluate and make recommendations on their use by DP organizations within General Dynamics.

He also assists computer centers in preparing forecasts of future equipment and material needs.

McMillan holds a B.S. in mathematics from Central State College in Edmond, Okla. and an M.B.A. from Pepperdine University of Los Angeles.

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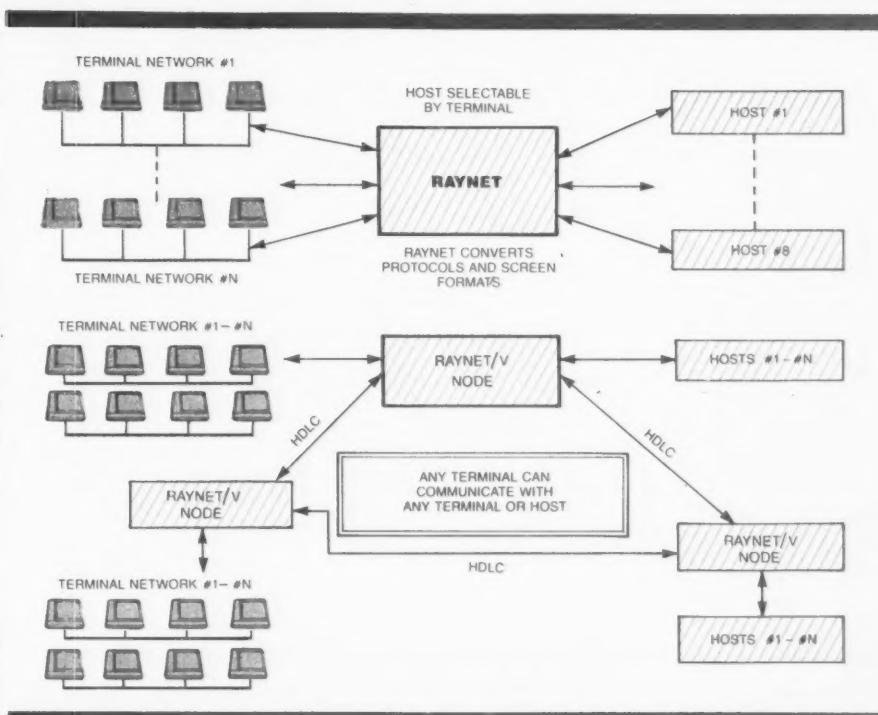
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ESC. And End Block character. A New Line character sequence. A field separator. And even a function sequence preamble.

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Adapso Meeting Told: Iron Only 16% of Service Firm's Costs

By Marcia Blumenthal

CW Staff

NEW YORK — Illustrating the importance of the value-added component of the computer services industry, Richard Crandall, president of Comshare, Inc., said that hardware costs today represent a mere 16% of a service firm's total cost of providing services.

This value-added emphasis is the key to the success of the services industry, which last year had total revenues of \$7.5 billion, a 19% increase from 1977. Moreover, pretax profits climbed 27% reaching \$900 million in 1978 vs. \$700 million the year before.

Crandall and other representatives of the Association for Data Processing Service Organizations (Adapso) highlighted the indus-

try for a group of financial analysts here last week. The major portion of the association's sixth annual financial analysts meeting was the presentation of the results of an Adapso-sponsored survey performed by Input, a California-based market research firm.

Other major topics discussed during the well-attended gathering were the ongoing "in-house" minicomputer controversy and the fast pace of service firms' acquisitions.

Three Distinct Sectors

According to the Input survey, the computer services industry consists of three distinct sectors:

- The traditional data processing service firms, the largest sector accounting for 74% of the revenues and 82% of the profits of the

service industry.

- Software development firms, with \$760 million, or 10%, of the total revenues.

- Professional services companies with \$1.2 billion, or 16%, of the revenues. This category includes such activities as custom programming and facilities management.

Software companies are currently logging the fastest rate of growth, with a 27% increase in revenues last year, according to Walter Smith, director of Input's computer service program. Processing firms grew 18% and professional service firms 20%. Respondents to Input's survey tended to be the largest and more successful firms; so Input therefore extrapolated the final results to apply across the industry.

Although the average pretax profitability for the industry was 11%, professional service firms reported 6% pretax profitability, considerably below the industry average. These firms are susceptible to inflation because they do a great deal of labor-intensive custom work, often on a fixed fee basis.

To counter this inflationary pressure, professional service firms expect fixed-fee work to increase by only 12% next year as opposed to 75% during 1978, Smith remarked.

Although continued inflation and a predicted economic downturn loom on the horizon, the services industry is predicting strong growth.

Last year, processing firms responding to Input's survey predicted revenue growth of (Continued on Page 60)

GTE, Telenet Finalize Merger After FCC Relaxes Restrictions

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — General Telephone and Electronics Corp. (GTE) has consummated its acquisition of Telenet Communications Corp. following a decision by the Federal Communications Commission (FCC) to relax the conditions it initially imposed on the merger.

The FCC handling of the merger is presently being studied by AT&T to see if it sets a precedent that might be applied by the commission when it considers AT&T's Advanced Communications Service (ACS) proposal. GTE was required by the commission to operate Telenet as a separate subsidiary.

The FCC decided, however, to relax some of its restrictions on, among other things, the exchange of proprietary information between GTE and Telenet, the sharing of research and development and GTE financing of its new subsidiary. The June 11 FCC decision followed arguments from GTE and Telenet that the conditions would not allow Telenet to remain competitive in the domestic telecommunications market [CW, June 11].

Following the commission's action, the two firms completed the merger on June 13. The union had been delayed a total of six months while the FCC studied possible antitrust and anti-competitive impact concerns raised by the merger.

Telenet stockholders received approximately two million shares of GTE common stock, valued at about \$55 million at the time of the merger.

The FCC's actions in the merger deliberations and its recent "tentative decision" in its second Computer Inquiry are generally seen

as describing a pattern for future regulatory decisions by the commission. The May 17 tentative decision called for regulated communications carriers to set up separate subsidiaries if they want to offer hybrid computer/communications services [CW, May 28].

According to ACS Project Director Frank Vigilante, AT&T is trying to assess the effect (Continued on Page 61)

Datatrol Scorecard Mixed In Bottom of the 10th

By Marcy Rosenberg

CW Staff

HUDSON, Mass. — Datatrol, Inc. ended its 10th season in business with several wins, one loss and one contest that has gone into extra innings.

At a recent meeting to celebrate the firm's anniversary, Datatrol executives toasted plans for a \$3.3 million expansion, spurred by a winning growth record since the company became a subsidiary of Applied Devices Corp.

At the 10-year mark, however, the firm also saw the sudden departure of President Edward Walter — barely a week before the festivities. However, it has yet to see an end to its legal battle for an eight-figure contract from the Massachusetts State Lottery Commission.

Named to replace Walter as president and chief executive was Leon Jackson, a Datatrol founder and executive vice-president of

marketing since 1970, who echoed the company's prepared statement that Walter "resigned to pursue other interests."

Jackson termed his predecessor's departure "unexpected," but added that Walter left on "excellent" terms and would be retained as a consultant for six months to aid the transition to new management.

Reached at his home, Walter said he resigned to pursue several opportunities to buy his own companies in the "computer electronics area" — firms that, unlike Datatrol, are independent companies. He declined to be more specific about his future plans except to say that he is looking at "one start-up situation."

Walter joined Datatrol as a consultant in 1976 when the firm was about to win a contract to computerize the Michigan state lottery. He became project manager on that job until it was completed in early 1977, when (Continued on Page 60)

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COMPUTER INDUSTRY

Datatrol Marks 10th Anniversary; Results Mixed

(Continued from Page 59)
he was named president.

A company spokesman said Jackson was offered the presidency three times before the firm hired Walter. Finally accepting the position, Jackson plans to continue Datatrol's industry-specific marketing orientation to develop transaction processing terminal systems for the markets it has traditionally served: retail, banking and public gaming.

Along these lines, the firm recently introduced a mini-computer-based retail credit management system with software and programming to allow the system to interface with point-of-sale or credit terminals, Jackson explained. Other features include collection management, new account and payment history scoring, automatic bill adjustments and account maintenance.

Said to handle up to 60,000 credit authorization transactions an hour, the new RS-9000 system is priced

from \$200,000 to \$700,000, with first deliveries set for the fall. So far, Datatrol plans to deliver three systems this year, one each to retailers Lord & Taylor, Jacobson's and Dayton's.

Favoritism Charged

The company's most recent thrust in the public gaming market is moving at a slower pace. Datatrol has been fighting a court battle since March to prevent Massachusetts' Lottery Commission from awarding a \$25 million contract to General Instrument Corp.'s American Totalisator (Amtote) subsidiary to computerize the commonwealth's daily numbers game [CW, March 19].

At the time, Datatrol claimed it undercut Amtote's bid for the contract by about \$5 million and charged that the commission showed favoritism to Amtote by failing to give preference to a Massachusetts company as required by state law.

In most recent developments, the state appellate court upheld prior state court rulings declaring the Amtote contract null and void because it was not awarded on a competitive, lowest bid basis.

But the legal tug-of-war continues. The State Attorney General's Office, which earlier upheld the contract, plans to take the case to the court of appeals to seek a judgment to allow Amtote to begin installing the automated on-line lottery system.

Datatrol hopes ultimately to win the contract, but is confident that at least the court will rule that the contract be put out for rebid, according to Jackson.

Expansion Plans

Meanwhile, the firm has decided to expand in Massachusetts near headquarters here, despite high taxes that have discouraged other companies from locating in the state.

Datatrol signed a definitive contract to build and equip a 60,000 square-foot facility to house manufacturing, engineering and field service operations which will "double our capacity for terminal production," Jackson said.

The facility will provide a means to expand retail, public gaming and financial product lines and support company plans to become "a major factor in the emerging electronic funds transfer market," he added.

The company is expanding to accommodate consistent growth since 1975, when Applied Devices acquired a majority interest in the then-bankrupt firm. That year, Datatrol reported a \$3.3 million loss on sales of \$1.8 million.

In 1976, Applied Devices acquired the remaining Datatrol shares in an exchange of stock. Working capital supplied by Applied Devices brought Datatrol into the

black with \$300,000 earnings on \$5 million revenues in 1976.

Profits climbed to \$5.1 million in fiscal 1978 ended Oct. 31 when sales reached \$27 million. The company is projecting \$45 million in sales by the end of this fiscal year.

Lottery Hopes

Slated for completion before the end of the year, Datatrol's expansion will create 200 jobs in Massachusetts, a prospect that pleased one of the attendees at the 10th anniversary proceedings — Massachusetts Gov. Edward King.

"We hope our next job will be a gift of Gov. King of the Massachusetts Lottery System to provide the state with \$75 million a year," remarked Robert K. Stern, Datatrol chairman and president of Applied Devices. He admitted, however, that "we may have to go to the U.S. Supreme Court to do it."

Hardware Comprises Only 16% Of Service Company's Costs

(Continued from Page 59)
22% and actually grew by that amount, Smith noted. Next year these firms expect revenue growth of 19%.

Software firms were a bit less accurate with their predictions, forecasting a 48% gain in revenues but achieving 39%.

"Software firms are very bullish on marketing and have a 'we can do anything attitude,'" Smith said, explaining the disparity in the results. Software firms expect a 37% increase in revenues this year.

The slightly lower predictions across these two industry categories are probably attributable to expectations that the economy will slow this year, he added. Yet five-year predictions made by processing and software firms last year indicated an overall long-term growth of 23%, up from the 21% five-year growth predictions made in 1977.

In addition to the prediction for continued strong growth in the services industry, acquisition fever has hit the industry. Of those responding to the survey, 41% said acquisition is part of their plans.

Crandall noted, however, that only about two dozen service firms have the financial resources to acquire other companies.

But hardware companies are actively seeking service companies. An example was Intel Corp.'s acquisition of MRI Systems Corp. last year, Crandall pointed out.

Within the processing sector of the industry, large firms (those with sales of more than \$10 million annually) generated 53% of the revenue in 1977 and 55% of the revenue last year, which Crandall thinks belies the consolidation within the processing industry.

No Rush to Minis

While the acquisitions arena is hot, service companies are not rushing to supply user sites with in-house minis. A couple of years ago, the service industry anxiously eyed the inroads minis were making into their customers' operations. At that time, many service firms were convinced selling minis to user sites was the way to prevent minicomputer firms from taking away business.

While the trend is still on the upswing, it appears half the service firms are taking a "wait-and-see attitude," Smith noted. In 1978, 52% of the responding firms said they were installing minis at customer's

sites. This year 55% of the companies said they are engaged in this activity.

To date, service firms have installed 2,004 minis in customers' premises, and by the end of this year 5,006 units will have been installed.

While initial revenues derived from the sale of these minis beef up a service firm's profitability, the continued profitability of providing maintenance and other services is still questionable, Crandall concluded.

DASD Reports Record Results

MILWAUKEE — DASD Corp. marked the end of its fifth year in business with record sales and profits. Sales increased to \$15 million from \$8.5 million a year ago. Earnings rose by more than 30%, topping \$800,000.

With a profit goal of \$1.8 million for fiscal 1979, the service firm intends to expand its business during the year.

The company has 430 employees in 19 offices throughout the U.S.

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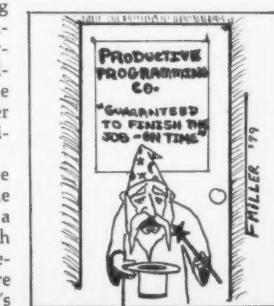
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Total Industry Revenues: \$49.6 Billion Study Puts IBM's 1978 Market Share at 34%

WALTHAM, Mass. — With \$17 billion revenues reported last year, IBM continues to dominate the computer industry, gobbling up 34% of the \$49.6 billion in total 1978 DP revenues, according to a report recently published by International Data Corp.'s (IDC) Continuous Information Services.

IBM, along with NCR Corp., Burroughs Corp., Sperry Rand Corp., Control Data Corp., Digital Equipment Corp. and Honeywell, Inc., accounted for 57% of all DP revenues last year.

While each of these seven industry leaders participate in the mainframe market and, in the early 1970s, culled the bulk of their revenues from general-purpose computer sales, each is expanding into at least three or four other industry segments.

Even so, general-purpose computers contributed about 48% of all DP revenues, or \$23.7 billion in 1978, a figure expected to jump to \$37.3 billion by 1982, IDC predicted.

GTE, Telenet Finalize Merger

(Continued from Page 59)
of those two decisions. "It would seem that what they're doing there is going to foreshadow what they are going to do with ACS," he told *Computerworld*.

According to a senior FCC attorney, however, ACS "is still an open question." He conceded that some people, including within the commission itself, are arguing that the GTE-Telenet decisions illustrate how the FCC will handle the ACS proposal. However, "this commission has never been known for its consistency."

Noting the great difference in revenues and market power between GTE and AT&T, the FCC staffer said "it would seem that the difference in magnitude alone would leave open the question of what to do about ACS."

Philip Nyborg, vice-president of the Computer & Communications Industry Association (CCIA), which has been an active opponent of ACS, agreed that the "extraordinary market power of AT&T will probably necessitate different FCC regulatory actions for ACS than the commission took on the GTE-Telenet merger."

"Where the parent firm has considerable market power, such as AT&T does, I would think and I would hope that the commission would adopt appropriately stronger restrictions," Nyborg said.

Supershorts

Advanced Patent Technology, Inc. in Las Vegas entered into a joint venture with NIS, Inc. to develop a proprietary casino management system. As part of the deal, Advanced Patent acquired a substantial interest in NIS.

Automatic Data Processing, Inc., an independent computer services firm, opened a Western division in La Palma, Calif.

The next largest contributors in descending order of market share were independent peripherals, 17%; computer services and software, 14%; and minicomputers, 7%.

Further down the line were leasing and used computers, 6%; small business systems — defined as "entry-level systems for the first-time computer user" — at 5%; and, finally, supplies and accessories, predominantly paper, contributing 3%.

Mini Growth: 29%

Turning back to minicomputers, the report forecast a 29% compound growth rate from revenues of \$3.4 billion last year to \$10 billion by 1982.

Although distributed data processing (DDP) has spurred minicomputer market growth, IDC expects increased penetration by terminal-based vendors into the DDP arena to impact mini sales in that area.

In 1978, 16% of total mini shipments ultimately reached the DDP user; by 1982, that number should increase only moderately to 23%, according to the report. As a result, application areas such as problem solving, automation and control will emerge as the primary markets for minicomputer suppliers, IDC said.

Today, about 35 suppliers actively jockey for position in the minicomputer market. DEC still reigns as market

leader, capturing \$1.24 billion in revenues last year. Hewlett-Packard Co. ranks second with \$535 million, followed by Data General Corp., reporting \$380 million; Honeywell with \$200 million; and Perkin-Elmer Corp., \$113 million.

As for small business computers, 1977 U.S. shipments totaled 21,350, valued at more than \$800 million. Last year, shipments nearly doubled to 40,000, worth more than \$1 billion.

IDC predicted that in 1982, shipment value will climb to over \$2.6 billion and skyrocket by 1987 to \$9 billion.

Priced at \$3,500, the report is available from IDC at 214 Third Ave., Waltham, Mass. 02254.

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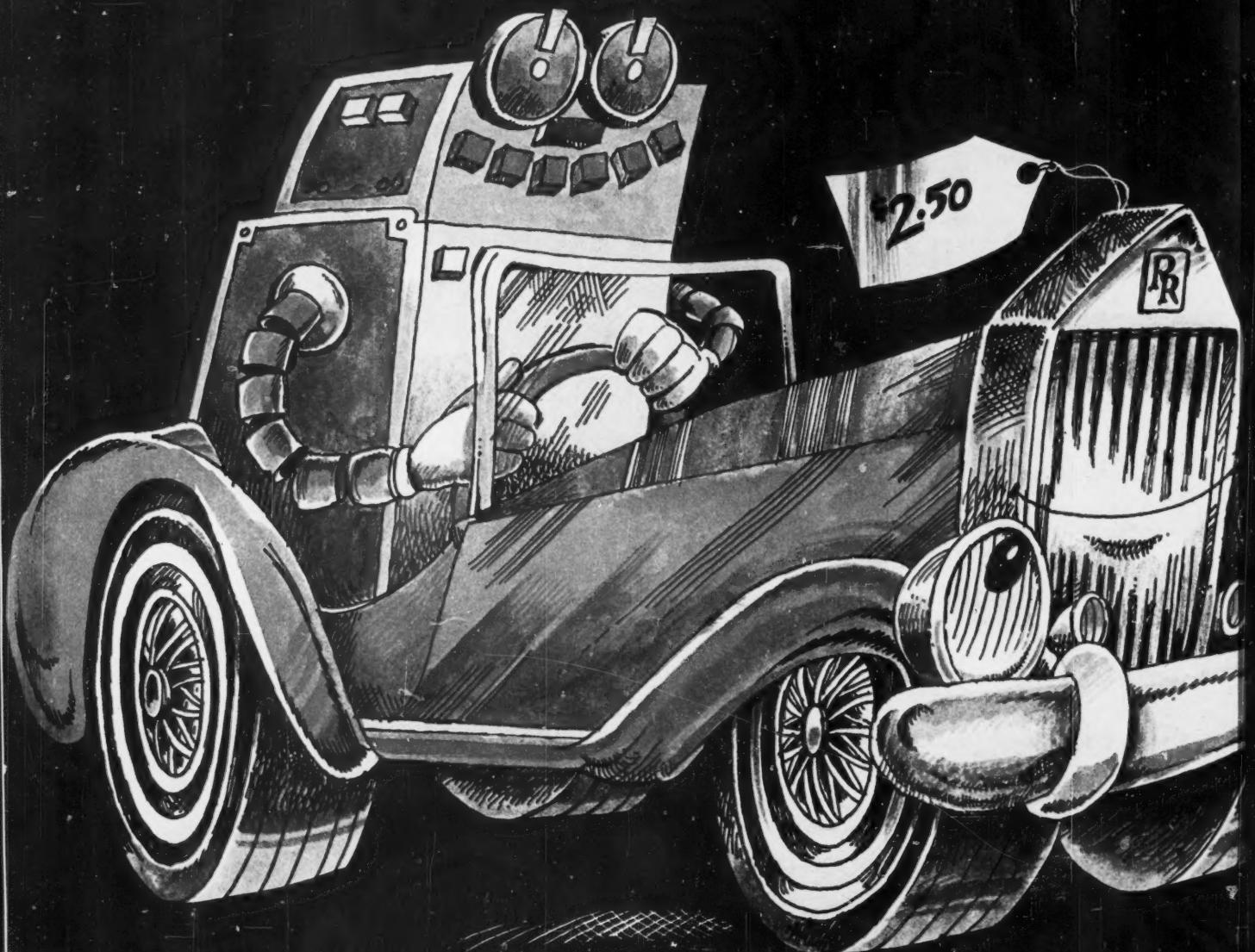
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the headline quote from a prominent industry executive makes so clear). In only thirty years the industry has gone from the development of the giant Eniac system, through the tube-powered, water-cooled Univac I (the world's first business computer), to the incredibly cheap, battery-powered microprocessor.

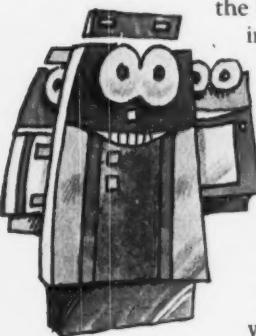
But as unbelievable as the last 30 years have been, the next 30 will probably be even more incredible.

Right now, IBM has begun delivery of a new computer series that will, by itself, provide four times as much processing power as all the previous computers delivered by the company. And they have announced a new "superconductor" that could improve computer speed and performance by a factor of 500 in the next seven years! It's hard to remember this is real science, not fiction.

This extraordinary increase in efficiency has led to a rapid expansion in computer use, as human ingenuity finds more and more applications for these powerful tools. So the market for computer products and services has turned out to be more elastic than most observers had thought. Worldwide expenditures are currently at \$75 Billion, and growing by 20% a year.

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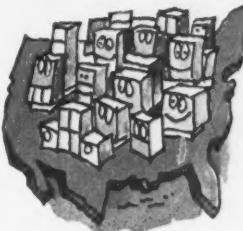
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Semi Industry Reps Raise Alarm on Japanese

By Jeffry Beeler

CW West Coast Bureau

SAN FRANCISCO — Unless the U.S. counteracts Japan's alleged unfair trade practices, the domestic computer and telecommunications industry will become dangerously dependent on the Japanese for its components, just as the economy in general already relies on the Middle East for much of its oil.

That grim prediction resurfaced here recently when five semiconductor industry spokesmen testified during an International Trade Commission (ITC) hearing on integrated circuits and their use in computers.

The five spokesmen included Intel Corp. Vice-Chairman Dr. Robert Noyce; Advanced Micro Devices, Inc. Chairman W.J. Sanders; John Nes-

heim, treasurer of the National Semiconductor Industry Association; Economic Consulting Services, Inc. (ECS) President Stanley Nehmer; and ECS Vice-President Bruce Malashevich.

Although most of the witnesses pronounced the U.S. semiconductor industry in excellent health, all five voiced grave concerns about the industry's long-term survival prospects. Testifying before a four-member panel headed by ITC Chairman Joseph Parker, they cited anticompetitive trading practices by foreign suppliers as the chief threat to the domestic semiconductor industry's continued prosperity.

Compared with their American counterparts, overseas firms operate under an entirely "different set of [economic]

ground rules," Sanders explained. Whereas U.S. companies espouse a free market philosophy, most foreign competitors operate within tightly controlled economies characterized by steep import barriers and massive transfusions of government capital.

With their own markets secure from outside competition, overseas semiconductor manufacturers have adopted a two-tiered pricing policy in which products sold at home bear greatly inflated price tags while components shipped to the U.S. sell for much lower amounts, often with perilously low profit margins.

American semiconductor manufacturers, by contrast, must maintain comparatively high profit margins to finance the immense research and de-

velopment effort so crucial to survival in a field where the number of functions per circuit chip has zoomed from 30 to 135,000 since the mid-1960s.

Without adequate capital to continue pioneering a rapid succession of new product generations, U.S. suppliers will slowly lose their traditional place at the forefront of the electronics revolution and eventually be eliminated from effective competition in the semiconductor industry, the spokesman said.

For domestic mainframe and telecommunications equipment vendors, the effects of such a decline would prove catastrophic. Lacking an adequate supply of integrated circuits at home, American hardware manufacturers would be forced to turn to overseas sources for their electronic components, Noyce predicted.

The historically rapid pace of development in the computer industry would slow perceptibly and strategic industries like defense would become heavily dependent on foreign semiconductor suppliers for the integrated circuits that form the heart of most advanced electronic weapon systems.

'Electronics' Crude Oil'

All these implications have prompted Sanders to characterize semiconductor technology as the "crude oil of electronics" and to liken the potential reliance on foreign semiconductor suppliers to the U.S.' current dependence on foreign oil.

"Semiconductors underlie the entire electronics industry and its favorable balance of trade," Sanders said.

Advances at the systems level invariably follow on the heels of breakthroughs at the component level, and if the U.S. loses its self-sufficiency in semiconductor technology, the computer industry's historically rapid pace of development will languish as a result, the spokesman added.

Although American makers of integrated circuits face dangers from many foreign sources, the chief threat to the industry's continued health comes from Japanese suppliers, the witnesses warned. Japan's central economic planners have designated high-technology electronics as their next "target industry," and efforts to gain an upper hand in that market have already begun.

In fact, Nehmer noted, the first skirmish in the expected Japanese invasion "is already being fought in a rather small but important corner of the total market" — the 16K-bit random access memory (RAM) field.

Although 16K RAMs account for only about \$200 million of the \$3 billion U.S. semiconductor market, "a producer's fate in the 16K RAM field will determine its likelihood of success in the next generation of integrated circuit development," Nehmer said.

If true, Nehmer's observation bodes ill for the domestic semiconductor industry's future. The Japanese have already captured 35% of the American 16K RAM market — well ahead of their projected target — and the share will surely grow unless the U.S. government acts promptly, Noyce predicted.

"Capturing the 16K RAM market is like taking the top of a hill," Sanders explained. "Once you have it, all you have to do is shoot down."

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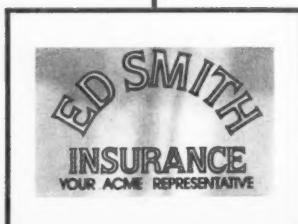
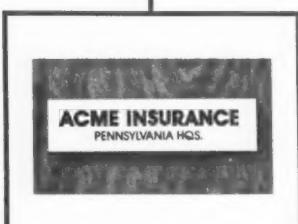
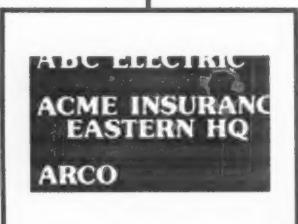
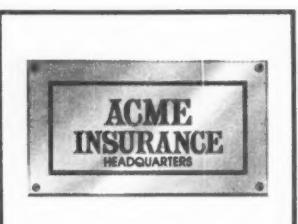
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Contracts

Informatics, Inc. has been awarded a contract by the Library of Congress' Congressional Research Services. Under the \$160,000 contract, the firm will develop a data base system, create a statistical report format and prepare financial reports for Congress.

Okidata Corp., through its Canadian distributor, Electronic Systems Ltd., has been awarded contracts totaling more than \$1 million by Gaec Canada Ltd. The firm will supply 200 of its CP110 serial printers and 500 of its CP210 document/passbook printers to be used with Gaec systems.

Anacomp, Inc. has signed a \$3.5 million contract with the First Trust Bank of Ontario, Calif. Anacomp will utilize its Customer Integrated Reference File software package to process accounts for the bank's 20 branches.

Sanders Associates, Inc. has received a \$2.6 million contract from the Federal Aviation Administration for an electronic tabular display subsystem and associated support.

Okidata Corp., through its distributor, Datakor of South Africa, has been awarded printer contracts totaling more than \$925,000. The firm will supply 200 of its CP210 document-/passbook printers as part of a system for a savings and loan institution.

Univac has received a contract from the First Savings and Loan Association of Saginaw, Mich., valued at approximately \$400,000 for a 90/60 system.

Planning Research Corp. has won a contract to provide DP support to the Department of Energy's Energy Information Administration. The initial contract is for one year and calls for task-ordered assignments that could total more than \$1 million in fees. The contract provides for two one-year options, with an estimated value of \$1 million each year.

Recognition Equipment, Inc.'s subsidiary, Recognition Equipment (Canada) Ltd., has received a contract from the Robert Simpson Co. Ltd., Toronto, for the lease of a Trace system which has a purchase value of \$1.9 million.

Recognition Equipment Inc.'s subsidiary in West Germany, Recognition Equipment GmbH, has received a contract from Bayerische Hypotheken- und Wechselbank, Munich, for the lease of an Input 80D system worth \$500,000.

The Peripherals Division of Pertec Computer Corp. has been awarded a contract totaling more than \$400,000 for rigid disk drives by the Braegen Corp. Under the terms of the contract, D3400 drives will be used with Braegen Corp.'s B40 intelligent controller.

EVEN NUMBER
CRUNCHING
PROGRAMS
CAN BE
OUTPUT BOUND
SEE PAGE S/22

Citel Takes New Name

ORANGE, Calif. — Citel Corp. has had plenty to worry about. It recently lost its manufacturing facility and encountered difficulty in getting its financing in place.

Moreover, IBM's 4300 announcement forced the fledgling plug-compatible maker to begin redesigning its products.

To top it off, Itel Corp. recently threatened a legal action unless Citel changes its name. Pointing out in a recent letter to Citel that Citel's business is directly competitive with that of Itel, Itel's lawyers told Citel that continuing use of its name would "cause confusion and deception and . . . constitutes unfair competition and is an infringement on

our client's trademark."

Well, Citel has knuckled under, changing its name to Multiprocessors, Inc.

A Sign of Arrival

Although the situation is no laughing matter, Larry Taylor, chairman of the board, quipped, "Maybe it's a sign of having arrived when a company the size of Itel feels it is in danger of having its market share significantly reduced [by Citel]. I was kind of hoping my first suit would be brought by IBM."

Taylor said he called Itel's lawyers attention to the fact that Itel opened its doors two years after Intel. "We

didn't feel our name was any more misleading than Intel's. Itel wasn't willing to listen to that."

Citel isn't in the position to carry out an entangled legal battle with Itel and for that reason agreed to change its name.

At present, Multiprocessors' Model 5, equivalent to the IBM 3031, is not yet in production. However, the company is in the late phase of product development and expects to ship its first Model 5 about the first of next year, Taylor reported.

The models 3 and 4, positioned against the 4300, are also not in production.

The Nodes Know.

Find out how much in our July 30th Special Report on *Distributed Processing*. As the cost of communication goes up and the price of hardware goes down, are minicomputers in a distributed network a more desirable alternative? Is distributed data processing the new wave of the future? Here are some of the issues we'll be taking a look at in this Special Report:

- When does an organization go to a DDP network?
- How can the change take place cost effectively and with a minimum of disruption to the organization?
- What are the potential drawbacks of having more intelligence and autonomy in the field?

Edited by Brad Schultz, this Special Report will provide answers to these questions along with a discussion of the profound impact DDP is having today on the internal operations of large organizations.

If you're a user who watches the trends, you'll want to have the most up-to-date information about DDP and you'll find it in our July 30th report. Closing date is July 13th.

And if you're marketing products or services in the DP field, you'll want to make sure your ad is there. Contact your Computerworld salesman, or call Frank Collins at (617) 965-5800.



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SYSTEMS IMPLEMENTATION

Test Engineers

Responsibilities include writing test procedures, analyzing products, assigning test standards, do memory systems test design modifications on new equipment.

Material & Production Control Planners

Background for this position should include three to seven years in Material & Production control techniques, such as analysis of marketing and sales, will forecast production build schedules, process the MRP for material buys, P.O. cancellations, etc. Will interface with other production and material control groups, purchasing, Quality Assurance and Engineering Services.

Quality Assurance Supervisors & Engineers

Requires BSIE or BSEE plus two to ten years experience in QA. Engineer positions including planning product releases, spec writing and establishing guide lines in a QA functional environment. Technical understanding in the administration of Mil Spec 2178, reliability prediction, NTRBF, failure analysis in a commercial environment, field performance summaries, memory boards and systems analysis.

Hardware Technical Writers

Three to ten years experience writing technical manuals, associated with computers and/or computer products. Must be capable of reading logic drawings, schematics and have knowledge of a hexadecimal numbering system. Will collect technical information regarding IBM compatible memory systems and transpose information into installation instructions. Theory of Operations, wire lists and maintenance manuals, etc.

Manufacturing Engineers

Two to seven years Manufacturing Assembly Support (assembly methods Documentation of sub-assembly, final assembly harness and cable, PCB fab, workmanship standards. Vendor Fab processes, material review board). Will transfer, new products from Development Engineering into Manufacturing.

Product Support Specialist

Requires operating system level software experience or (ideally) hardware development experience (preferably microprocessor or mini-computer). Also required is a strong marketing sense (people-oriented). You will interface with customers, sales people and product managers.

ADVANCED HARDWARE DEVELOPMENT

CPU/Memory Design I/O Interface

Experience with microprocessor hardware design is required, with emphasis on CPU memory and I/O interfaces developing a total machine concept involving intense interpersonal interaction with a program team. BS, MS, PhD in EE, plus two to seven years design experience.

Microprogramming Specialists

To work on CPU's, compilers and emulations, creating original as well as emulation programs. In addition involved with telecommunications systems. Strong background in IBM operating systems, VTAM, BTAM, and OTAM. Some knowledge of systems network architecture with DOS and VM/370. Technical degree plus two to seven years program design. Working with multiprocessor and microprogrammed machines a plus.

SYSTEMS POS OPPORTUNITIES

Engineer & Supervisors

- Production
- Quality
- Industrial
- Manufacturing

POS products include cash register computers, terminals, and optical scanning devices. We're looking for qualified professionals who are willing to be involved with systems at the hands-on level. If you're an experienced industrial engineer, quality engineer, or production supervisor with a relevant technical degree or experience, contact us.

Microprogrammers

Responsibilities will be to design and develop programs based around a PACE chip, creating an intelligent terminal in a communications environment. BS/MS in Computer Science and/or equivalent technical experience required.

Mini & Micro Computer Programmers

Requires one to three years experience working with 16 bit minicomputer systems with standard operating systems and languages. You will be working on developing new point of sale systems using various programming techniques. BS/MS in Computer Science and/or equivalent technical experience required.

For more information about these opportunities, please call Jim Rook collect at (408) 737-5255, and send your resume to his attention immediately at: National Semiconductor, MSD 2725, 2900 Semiconductor Drive, Santa Clara, California 95051. An equal opportunity employer m/f/h.

MINI & MICRO COMPUTER DESIGN ENGINEERS

Microcomputer Systems Design Engineers

You will be participating in the definition of new state-of-the-art microcomputer based products. Candidates should be familiar with 8080, 8085, and Z80 microprocessors, and should have at least three to five years design experience. Some programming in machine, assembly or other high level languages, and experience in the use of in-circuit emulators will be highly desirable.

Data Communication Engineers

You will be participating in the definition and design of a family of new data communication products to be used in microcomputer based systems. Candidates should have experience in design of front end processors, concentrators and/or terminal controllers, should be familiar with SNA, A-CS and X25 internetwork interfaces. Experience with Bisync, SDLC, HDLC and ADCCP link protocols. At least three to eight years of systems design experience and familiarity with minicomputer and microcomputers desired.

ADVANCED SOFTWARE SYSTEMS DEVELOPMENT

Systems Programmers

These people will be joining a talented group in the development of a PASCAL based software production system. Help us implement a comprehensive set of powerful, user-friendly software tools which will assist in the design, development, integration, testing, distribution and maintenance of software products for a variety of target processors. One to ten+ years experience necessary. Experience with any of the following will be a plus:

- High level PASCAL like languages
- Structured programming and modular design
- Relational data base management systems
- Operating systems or compiler design
- Large scale software development efforts

MINI AND MICRO COMPUTER SOFTWARE DEVELOPMENT

Operating Systems Designers

Participate in the design, development and validation of state-of-the-art real time operating systems. Familiarity with firmware implementation of OS primitives and structured design techniques preferred.

Language and Compiler Specialist

Will be involved in the design, and implementation of language processor using PASCAL, FORTRAN, BASIC and COBOL. Knowledge of compiler optimization techniques, systems implementation, languages and high level language support via firmware are preferred.

Systems Utility Specialist

You should understand design techniques for interactive test editors, micro assemblers, linking loaders, symbolic debuggers, file utilities and device utilities.

Diagnostic Systems Design Specialist

Senior position offers challenging systems design opportunities involving micro diagnostics and on-line diagnostics, running under and operating system. Responsibilities include design implementation and documentation of complete diagnostic systems for detecting and isolating hardware failures.

Macro Assembler Designers

Should possess two to seven years of software experience and a technical education in EE or Computer Science.

Language Designers

Opportunities exist in these areas to design and develop languages to operate on next generation computers, using the newest microprocessor technology. Requires two to seven years experience in computer language design, plus a BS, MS, PhD in Computer Science and/or EE.

Project Manager Operating Systems

Direct the technical effort on development of a real time, multi-tasking operating system for a state-of-the-art, virtual memory based microcomputer system. Requires a minimum of six years experience in operating systems, project management experience - from inception to completion and some knowledge of microprocessors.

Project Manager - System Implementation Language

Direct the technical effort on development of a compiler and source language debugger for a PASCAL-based implementation language for a state-of-the-art, virtual memory based microcomputer system. Requires at least six years experience in language development and project management experience. Familiarity with microprocessors a plus.

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Positions are available for software professionals who possess a background in scientific and commercial languages (FORTRAN, ASSEMBLER, BASIC, COBOL & RPG) and a good background knowledge of computer systems. Bachelor's degree in math, or computer science, or equivalent, plus experience in commercial applications, time-sharing, or real-time environments also necessary. Experience on DEC equipment, communications software, or in a project environment would be a definite plus. To find out more about these positions, please call or send resume to: R. Jerry Hanisko, (313)553-3000, DIGITAL EQUIPMENT CORPORATION, 32985 Hamilton Court, Farmington Hills, MI 48018. We are an equal opportunity employer m/f.

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Involves analysis, development of design specifications and computer algorithms, data base architecture, implementation, and analysis of results (including cost-benefit) for many areas of our business. You will contribute to the advancement of the art by implementing new technology and developing new techniques where no applicable methods exist. Appropriate background includes an advanced degree in computer science, statistics, operations research, industrial engineering, or finance, and/or applicable experience with systems analysis/design, and excellent written and oral communication skills.

Following are areas and functions of special interest among many current programs:

- Network data collection
- Data base management systems
- Mini/microcomputer based systems
- Network control
- Customer service support
- Simulation and financial algorithms
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- On-line order processing
- Customer record and billing systems
- Demand forecasting systems
- Mathematical network modeling and simulation
- Configuration and traffic engineering of specialized voice/data networks
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**PROGRAMMERS/
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There are many areas in which to apply academic background in data processing and/or your 2+ years of experience. SYSTEMS PROGRAMMERS establish standards for Long Lines and develop systems programs, performing software analysis, design, implementation, testing, maintenance and troubleshooting.

APPLICATIONS PROGRAMMERS engage in software design, implementation, and maintenance using structured design techniques.

Areas of special interest include:

- IMS/VS
- Minicomputer software. Prefer DEC (or other) systems. UNIX* operating system and/or C language
- MVS Operating System
- Data communications
- Data base management
- On-line data entry
- COBOL, PL/I, FORTRAN, ASSEMBLY
- TSO, TCAM, VTAM
- Data dictionary software
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- Statistical packages
- Disk and tape management aids
- Report generators

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An as instructor in the advanced programmer training curriculum, you will teach in four specialized areas: teleprocessing and on-line; IMS and data bases; advanced programming techniques (such as optimization, performance considerations, languages); and design techniques. Requires degree in computer science and/or applicable experience in batch applications design and applications programming, as well as strong oral communication skills. IMS programming languages and data management software experience would be desirable.

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You will be responsible for human factors engineering of computer-based information systems: analyzing, designing, and implementing materials associated with the interface between computer and user. You will interact with designers and users in specification, design and testing. Background should include advanced degree in human factors, psychology, or industrial engineering, and/or equivalent experience. Academic training or background in computer systems is also desirable.

These positions are in our Headquarters organization at various, easily accessible suburban New Jersey sites. We provide an excellent salary and comprehensive benefits program. Your resume (with salary history) will receive prompt, confidential consideration and response. Please be sure to detail applicable education including field of interest. Write: Professional Employment Director, AT&T Long Lines, Dept. CW1, Room 5A110, Bedminster, N.J. 07921.

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- o Develop new kind of medical information system for micro-computer using PDP 11 RSTS, in BASIC PLUS. Includes in-house data base management system and medical decision-making system, with clinical lab, pharmacy and clinic operation modules. Strong user interaction and responsibility from design through implementation of system. Requires BS in Computer Science or equivalent technical degree and 1 to 3 years experience., RSTS, BASIC PLUS and/or RSX 11-M desirable.
- o Development of a general Computer Simulation language. Work involves language development, compiler design, and programming. Applications extend to medical decision making and health planning. Requirements are BS and/or MS in Computer Science or equivalent. Experience with discrete event simulation helpful.

Salary depends upon qualifications and experience. Please send resume (if possible, college transcript) to: Ms. Joanne Lepper, 1001 West 10th Street, Indianapolis, IN 46202.

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Work in Houston on the world's biggest overseas projects

Aramco is also the key firm involved in the development of the energy resources of Saudi Arabia.

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In this key job supporting major projects in Saudi Arabia, we require process computer software engineers with BS degrees in engineering, math or computer sciences, and 3 to 5 years' experience in various real-time processes or SCADA projects.

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You'll be based in Houston but from time to time will have opportunities for interesting travel to vendors and to field sites in Saudi Arabia.

Interested? Write or send us your résumé, and we'll get back to you very soon. Write Aramco Services Company, Section DOM, Dept. CW062579A, 1100 Milam Bldg., Houston, Texas 77002.

ARAMCO/HOUSTON SERVICES COMPANY, DOMESTIC

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The Product Manager is a key position in the Product Management and Support Department. This manager will be responsible for the development of the product and the market plans of CRAY RESEARCH, INC. In-depth reports, refining marketing goals of the product, along with strategy for insured market acceptance is required in this position. The position requires an advanced degree in Business Administration or the equivalent. In addition, an undergraduate degree in Math, Physics, Computer Science or equivalent is highly desirable, plus the ability to work with the technical people in understanding of scientific processes. Engendered confidence and cooperation are skills required for the Product Manager position.

FORTRAN COMPILER DEVELOPMENT

We currently have an opening for a person with experience in FORTRAN Compiler Development. This position involves designing and implementing extension to our FORTRAN Compiler and requires a degree in Math, Physics, Computer Science or equivalent plus at least 2 years experience in Compiler Development. This position is located in our Mendota Heights, MN. facility.

OPERATING SYSTEM DEVELOPMENT

We currently have several openings in our system group for people interested in operating System Development for large scale scientific computers. These openings are in areas such as: I/O subsystems, file management, inter-active communication, system test/integration and front-end main frame communication. A degree in Math, Physics or Computer Science is preferred. There are openings for all levels of experience. These positions are located in our Mendota Heights, MN. facility.

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We currently have openings for talented computer professionals for assignment at several sites. Several years of experience on large scale computer systems is necessary. After several months training on the Super Scale Cray-1, the successful candidates will be assigned to a customer site.

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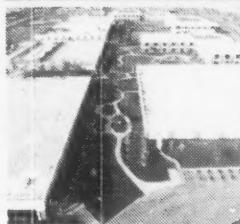
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Volume 2
Number 1

The Amdahl Newsletter

Engineering Software Is Seeking Computer Professionals



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You will develop, coordinate and evaluate hardware diagnostics and console systems. You will interact with field support, system test, and computer development personnel. This position is designed to expose the engineer to a variety of areas of the organization as well as to allow the engineer to contribute technically to Amdahl's state-of-the-art position in the large-scale computer industry.

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You will have challenging analysis and design responsibilities with diverse software systems-engineering applications, management information or computer hardware design.

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We are pushing the state-of-the-art in very large computer design with our Design Automation Software System. If you have experience in: AUTOMATED TEST PATTERN GENERATION, SYSTEM AND CIRCUIT SPEED ANALYSIS, DATA BASE DESIGN AND/OR ANALYSIS, LSI LAYOUT, VSAM, or LOGIC SIMULATION, and want to solve challenging problems working with innovative professionals, plan to contact us.

DIAGNOSTIC DEVELOPMENT

Amdahl is committed to the development of state-of-the-art diagnostics for its computer systems. We are looking for DIAGNOSTIC DESIGN ENGINEERS to design and im-

plement Hardware, Architectural and System level diagnostics. If you have experience in programming and a sound knowledge of Digital Logic Design and Large Computer Organization, we would like to talk to you about some very challenging positions.

CONSOLE SOFTWARE DEVELOPMENT

You will develop an operating system and hardware control programs for our mini-based consoles. You should have experience with small operating systems and an interest in man/machine and software/hardware interactions.

OPERATIONS SUPPORT

You will provide systems solutions for our expanding Operations and Applications Development activities. And will participate in teams developing support technology for our software development organization. A familiarity with data-base management is desired.

SOFTWARE DEVELOPMENT MANAGERS

Amdahl is known for its management strength as well as its technological strength. We are dedicated to the continued education of our managers. We have openings for first-level managers in engineering, software development. Applicants should have demonstrated leadership ability with a background in engineering or software development.

Qualified candidates are invited to indicate WM-E on their responses and direct them to Employment Department, Amdahl Corporation, P.O. Box 5070, Sunnyvale, CA 94086. We are an equal opportunity employer.

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Supervisor of Financial Planning/Budgeting

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Programmer

Requires schooling or experience in NEAT 3, COBOL, FORTRAN languages. Working knowledge of key punch. Flexible work schedule with some travel.

System Analyst

Requires schooling or experience in Computer Systems Analysis and Design.

Requires schooling or experience in NEAT 3, COBOL, or FORTRAN required. Flexible work schedule and some travel.

Submit resumes to Plateau, Inc., 4665 Indian School Rd., NE, Suite 113, Attn: Personnel Manager, Albuquerque, New Mexico, 87110. Receipt of resumes will be acknowledged. Plateau is an equal opportunity employer.

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SYSTEMS DEVELOPMENT MANAGER

Mathematica Policy Research, Inc. (MPR), a well-known and respected policy research organization headquartered in Princeton, New Jersey, is seeking an individual to direct a talented and innovative systems group in the development of a large-scale automated public welfare project in Vermont. The individual should have a broad range of experience in computer systems with the following desirable qualifications:

- Experience in project planning, scheduling and budgeting;
- Technical management of a large-scale systems development project;
- Experience in the development of on-line applications;
- Experience in organizational analysis and application design;
- Current advanced knowledge of computer hardware and software capabilities;
- Extensive knowledge of high-level programming languages and top down software design concepts;
- Familiarity with mini-computer technology;
- Knowledge of data base design concepts;
- Excellent written and verbal communication skills;
- Experience in the development of systems in the public sector, preferably in the human services area;
- Degree in computer/information science or related field.

The individual sought should have experience in all phases of the system life cycle with solid managerial experience in software development. Salary in high thirties and above, depending on experience. Benefits are liberal and include profit sharing and retirement.

If you believe that you can meet the professional challenge this position offers, send your resume and salary history to:

Juanita Bodden
**Mathematica Policy
Research, Inc.**

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If you are interested in talking with us about your next career move, call Mr. Bob Merryman at (214) 595-1911, ext. 285, or send resume in complete confidence to the address below. All responses will be answered.

DELTA DRILLING COMPANY
 Personnel Department
 P.O. Box 2012
 Tyler, TX 75710

Equal Employment Opportunity M/F

SENIOR SYSTEMS ANALYST

Bausch & Lomb, a leader in the manufacture of quality consumer products and scientific instruments, is currently seeking candidates to fill a new position in one of our major divisions, located in Rochester, New York. Candidates must possess a BS degree in Computer Science or Accounting and a minimum of five years' experience in a manufacturing environment. Ideally, professional experience would have included the elements of standard cost accounting related to the manufacturing and assembling of scientific optical products.

Reporting directly to the Division Controller, overall responsibilities will include the coordination and development of manufacturing-related systems. Prior experience with work-in-process and material requirements planning (MRP) systems is considered essential.

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data processing

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A leading multi-plant snack food manufacturer, division of one of the country's best known corporations, is seeking a results-oriented, self-starting individual to fill the position of:

Working environment includes an IBM 370/138 servicing local and remote manufacturing plants; DOS/VS operating system; on-line programming using ETSS, and a factory data collection system.

Responsibilities will include: design/programming of manufacturing, financial and management information system, assisting in systems programming functions, and hardware/software and communications planning.

Position requires:

- 3 years applications programming in ANS COBOL.
- Systems programming experience in an IBM 370 environment in areas such as SYSGENS, DOS/VS, VM/370, VTAM, ETSS, CICS, DL/1 and software installation.
- 1 year of applications analysis.
- Supervisory or project management experience a plus.
- Bachelor's degree also a plus.

This position offers a unique and challenging opportunity for an ambitious individual to develop a career path leading to systems analysis and systems programming.

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<p>Purdue University Computing Center, a large academic and research computing facility, has openings for</p> <p>SYSTEMS PROGRAMMER ELECTRONICS ENGINEER</p> <p>Applicant should have a B.S. or M.S. degree in computer science or electrical engineering or related area, along with at least one year of relevant experience.</p> <p>Systems programmer should have experience with Control Data 6000/Cyber operating systems. Will assist in development and maintenance of programming systems and assume programming project responsibilities.</p> <p>Electronics engineer should have experience in Digital logic design. Will assist in development and maintenance of Digital Electronic Equipment. Mini/micro computer programmer experience helpful.</p> <p>Salary range \$13,000 - \$20,000 With Excellent Fringe Benefits.</p> <p>Please contact or forward resume to Suzanne Magyar, Employment Representative, Personnel Services, Dept. 401, S. 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Send resume to:</p> <p>Charlotte McEachin Nevada State Personnel Capitol Complex Carson City, NV 89710</p>		<p>Computer Design Engineer</p> <p>Requires knowledge of one or more areas of specialization such as: computer logic design, including TTL, shottky and MOS device design; computer circuitry; memory, mechanization and state development; parallel input and output; equip. analogue digital, and/or hybrid computer programming and techniques; numerical analysis and advanced mathematics as applied to model MSEE degree beginning salary \$19,000.</p> <p>Qualified applicants should contact Pat Gallegos or send resumes. Evans & Sutherland Computer Corp., 580 Arapahoe Drive, Salt Lake City, Utah, 84108. Or, phone (801) 582-5847, ext. 336.</p> <p><i>Equal Opp by Employer</i></p>

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NOAA/NTIA, Personnel Services Division (4900), Attn: CSC Form 1170-4, Ms. Stoll, Ref. Vac. NOAAA/ERL-79-192LS. Applications must be postmarked no later than July 20, 1979 to receive consideration. An Equal Opportunity Employer.

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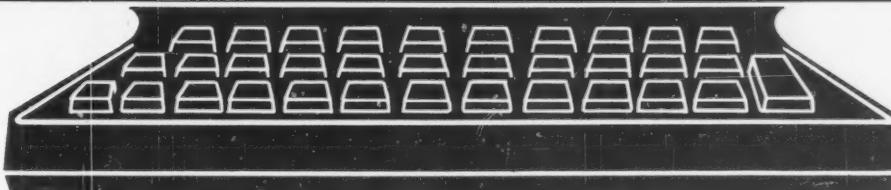
The professionals we seek should have in-depth knowledge of mini computer applications and BASIC programming; solid COBOL programming experience and proven design level skills in a 370/OS environment; or have IMS or MVS internals expertise.

Our commitment to your career development is backed by a competitive salary and comprehensive benefits which include educational opportunities as well as relocation to San Francisco, where you can enjoy the city's varied cultural and leisure activities. Please send resume and salary information in strictest confidence to:

LIZ WANTUCH, Employment Dept. CW625

CROCKER NATIONAL BANK

155 Fifth Street, San Francisco, California 94103



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APPLICATIONS PROGRAMMER/ANALYST

Immediate opportunity with U.S. Senate Center for programmer/analyst to assist in development and maintenance of a complex on-line financial management system. Working experience with CICS and ALC required. COBOL, MVS, M204 or other DBMS experience helpful. Salary negotiable. Send resume with salary history to:

**Manager,
 Administration Applications
 U.S. Senate Computer Center
 400 N. Capitol NW
 Washington, D.C. 20510**

SOFTWARE MARKETING REPRESENTATIVE

Leading N.C.R. systems software organization seeking representative for Chicago and Midwestern states. Current product line includes T.P., Monitor and DBMS. Candidate should be interested in Sales management and have two years of N.C.R. computer sales experience. Salary plus percentage. Send resume to:

**Marketing Director
 P.O. Box 880
 Concord, CA 94520**

FLORIDA CAREER OPPORTUNITIES

To meet our expanding needs, challenging positions are available. Our leadership role in the hospital industry along with an attractive Florida location combine to make these outstanding opportunities. B.A. or B.S. degree is desirable for all positions.

SYSTEMS ANALYST

Work in the planning, design, development and implementation of hospital data processing systems. Background should include 5 years programming and analysis experience, an expert knowledge of RPG II on the System/3 or 34 and good communication skills.

PROGRAMMER ANALYST

Responsibilities include the development of new hospital systems along with the streamlining of existing systems flow. Background should include 3 years RPG II experience. System/3 or 34 experience is a real plus.

PROGRAMMER

Handle a variety of batch and on line assignments along with documentation of current hospital systems and enhancements. Background should include 2 years RPG II experience.

In addition to outstanding growth opportunities for career advancement, we offer a competitive salary/benefits package. If you seek a climate that will exercise your talents and independence, we invite you to send your resume indicating salary to:

**David M. Hess, Director Hospital Division
 Medical Engineering, Inc.
 3949 Evans Avenue / Fort Myers, Florida 33901**

MANUAL SYSTEMS ANALYST

As a member of the systems design team, work with user management in designing, developing and implementing hospital systems along with analysis of current systems. Background should include 5 years systems experience and good communication skills. Industrial Engineering background is desirable.

SYSTEM SUPPORT SPECIALIST

You will work with the marketing department in installing systems, providing technical support and assistance and providing solutions to software problems at the customer site. Background should include 2 years systems or related experience. The abilities to communicate effectively and work independently are essential. Customer support and hospital background desirable.

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MARK IV PROGRAMMERS AND ANALYSTS

SRZ SOFTWARE SERVICES, the largest MARK IV consulting company in the USA, has openings for experienced programmers and analysts skilled in design and development of MARK IV systems:

Positions are currently available in:

- NEW YORK - NEW JERSEY METROPOLITAN AREAS
- BOSTON/CONNECTICUT
- MID WEST
- WEST COAST
- HOUSTON/DALLAS

If you are interested in permanent career as a professional consultant please send a resume or call:

SRZ SOFTWARE SERVICES

STEVEN R. ZEFF

PRESIDENT

SRZ Software Services, Inc.
61 North Maple Avenue
Ridgewood, N.J. 07450
(201) 444-9800
or

TONY LAMIA
VICE PRESIDENT

SRZ Software Services, Inc.
50 West Hillcrest Drive
Thousand Oaks, California 91360
(805) 497-6975

MODCOMP

We are an expanding MIS department at our headquarters in Fort Lauderdale and seek data processing professionals in order to support our current requirements. We are an established organization utilizing an IBM 360-50 OS MVT/HASP interfaced with front-end minicomputers and migrating to a 4341.

MIS POSITIONS

Positions are available to qualified candidates with a demonstrated proficiency in the 360/370 OS or VS environment. Degree preferred.

- Systems Analyst/Programmers
- Application Programmers

Applicants must have experience in the development, implementation and enhancement of large-scale financial, marketing and manufacturing systems. Experience with product assurance, customer service, configuration management or cost accounting is a plus.

• System Programmer

Applicants must have 3 to 5 years experience in such areas as utility programming, Job Control Language, MACRO and sub-routines, system generation, compilers, link editors and assemblers.

We offer highly competitive salaries and substantial fringe benefits including dental insurance and a stock purchase plan. If you are interested in finding out more about these exciting career openings with MODCOMP, please send your resume including salary history, or call 1-800-327-8997.

Dick Green

MODULAR COMPUTER SYSTEMS, INC.

1650 West McNab Road
Ft. Lauderdale, Florida 33309
Equal Opportunity Employer M/F

MODCOMP

CHIEF SYSTEMS ARCHITECT

A major career opportunity at fast-expanding NCR/Ithaca

The phenomenal, high-momentum growth of NCR/Ithaca has created a major opening for a Chief Systems Architect on intelligent terminals.

Reporting directly to the Director of Engineering, you will be expected to direct other division architects in the design of custom VLSI for the intelligent and interactive terminal family now being developed. Strong interpersonal skills are a necessity.

You must have complete, up-to-date knowledge of the advantages and disadvantages of all intelligent terminal architecture in the marketplace today and be able to make recommendations for superior follow-on designs.

Experience with digital and analog techniques, circuit design, component development, application of LSI and appropriate analytical tools are all necessary, as is a thorough knowledge of all available microprocessors and other integrated circuits. A general understanding of computer architecture used in mini-computers and mainframes is also desirable.

Your engineering background should be that usually associated with an advanced degree. You will also need a high degree of practical creativity as well as the good design judgment that comes from ten or more years experience in developing computer-related devices.

Salary will be high, and company-paid benefits, including relocation and househunting allowances, are what you'd expect from a Fortune 100 corporation.

The Finger Lakes Region

You will not only have an opportunity to join the world's second largest computer company in a senior position, but you'll be living in the heart of the beautiful Finger Lakes region. The NCR/Ithaca facilities are in a picturebook setting overlooking Lake Cayuga and nearby Cornell University.

Please send resume and salary history to Mr. B.W. Pitzer, Manager Professional Recruitment, Dept. J50, Engineering & Manufacturing, Ithaca, NCR Corporation, 950 Danby Road, Ithaca, NY 14850.

NCR

Complete Computer Systems

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SYSTEMS PROGRAMMERS IBM OS/VS1/MVS

Tired of sending resumes? We invite you, then, to pick up the phone and talk with another EDP professional.

Our MIS organization is experiencing dynamic growth in both personnel and equipment. Currently, our computer installation consists of an IBM 370-158 with 3330 and 3550 disk drives. Our plans call for continued expansion of this system, and during the summer we will be upgrading our hardware to a 370-168. Because of this, we are interested in talking with candidates who are interested in growth, too. If you possess a minimum of 4-6 years of IBM OS/VS1/MVS experience and a working knowledge of IBM's basic assembler language, you may be the person we are searching for. Additional requirements include familiarity with either PL-1 or COBOL, and strong organizational and communication skills.

Responsibilities include the specification and support of systems software; the development of backup and recovery procedures in a new processor installation; and the optimization of the processing environment through the use of proprietary software packages and through operating system tuning.

If you enjoy challenge and visibility in a position offering excellent growth potential, we invite you to call: Guy Coniglio, Manager, Technical Support, at 716-338-6063 and talk to him about your future. If you prefer, send your resume, including salary history, in confidence to him at:

BAUSCH & LOMB
P.O. Box 450, Rochester, New York 14602
An Equal Opportunity Employer M/F



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Data Processing Careers at Watkins-Johnson

Watkins-Johnson, one of the Bay Area's top 10 high technology companies, offers you more than just a job. We offer you the chance to help us maintain our success and respect within the industry while you enhance your career potential. We are seeking programming professionals to work in a up-to-date challenging environment, with IBM 370/148, VM, VSI, IMS, CMS, CICS and COBOL. We are growing, and offer these opportunities:

Manager, Data Processing Operations

We are currently seeking a manager of DP operations to be responsible for the current management and long range planning of data entry, data control, computer processing, and telecommunications network for our growing organization. Proven record of managing people and excellent communications skills essential.

Programmer Systems

Entry level management position is available for a decision making, problem solving, creative professional. Work includes development of effective long range, upgrade strategy and feasibility studies of new software products. We require a superior individual for this demanding position.

Please contact Ms. Karen Purtich at (415) 493-4141, ext. 2199.

If you are unable to call, please send your resume/inquiry or stop by: 3333 Hillview Avenue, Palo Alto, CA 94304. Or call (415) 493-4141, ext. 2210. We are an equal opportunity employer m/f/h.

WU WATKINS JOHNSON

SYSTEMS DEVELOPMENT New England Location

We are offering several challenging career opportunities for computer professionals who can meet our stringent qualification standards. Our Information Systems Department is expanding its professional staff in order to develop new systems for every major area of our business. This is a genuine ground floor growth opportunity for innovative systems development in a manufacturing environment. We are seeking a few creative, results-oriented individuals with demonstrated records of accomplishment.

BUSINESS SYSTEMS ANALYSTS

This position requires strong leadership, creative design and communications skills. The successful candidates will have a college degree and at least 3-5 years of solid business and systems design experience.

PROGRAMMER ANALYSTS

A solid background in systems development, design and programming activities (COBOL or RPG) is required, in addition to a college degree and at least 2-4 years of experience.

Qualified candidates should forward their resumes, in confidence, to Wayne Louder, W.R. Grace & Co., 62 Whittier Street, Cambridge, Mass. 02140.

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GRACE

EDP Technical Support

COMMUNICATIONS SPECIALIST

Key Position for Innovative, "Work-On-Your-Own" Specialist.

We're a \$2.3 billion dollar diversified company involved in a broad range of activities from natural gas transmission and propane to operation of a large petrochemical complex. We're part of the Alaska pipeline consortium and are expanding into coal mining. Our growth continues fast paced, supported by a strong centralized Corporate Systems and Data Processing Division.

This is a job for a specialist who understands data processing equipment and systems, with at least two to three years experience in creative problem solving involving data communications. Knowledge of IBM 370 architecture systems software and SNA communications (MSNF-VTAM/TCAM) is essential. This position requires a technical degree at the BS level. MS degree is a major plus.

We are installing a distributed processing network utilizing IBM 4300/8100 systems, including a communication link to a Burroughs B-7800, and you will play a major role in the total implementation process. While you will benefit from your interactions with our more than 100 EDP professionals, you will be strictly "on your own" with very broad responsibilities to improve performance of all our systems. Position is highly visible and can lead to an important advancement into Systems and Data Processing management.

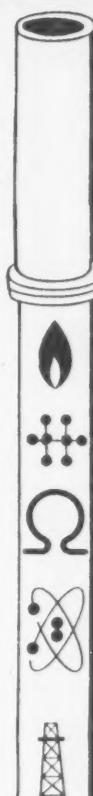
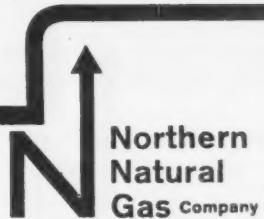
You will work in clean, uncrowded Omaha with plentiful housing, excellent schools, low cost of living and great outdoor recreation. A recent study pointed to Nebraska as number one "quality of life" among all of the fifty states.

The opportunity is challenging in a professional environment that rewards creativity. Outstanding starting salary to match your immediate responsibilities, plus an excellent company paid benefits package. Relocation expenses paid. Please call Mr. Jim LaHood collect at (402) 348-4403, or send your resume with salary history in complete confidence to:

Northern Natural Gas Company

2223 Dodge Street, Omaha, Nebraska 68102

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Ingersoll-Rand

Portable compressor division of Ingersoll-Rand Company, an international manufacturer of portable compressors, located in Mocksville, N.C. (near Winston Salem) has the following, immediate opening:

PROGRAMMER/ANALYST

We are looking for a qualified individual with a minimum 2-3 years experience IBM S/360/370, EDOS/DOS, DBOMP, COBOL. Manufacturing inventory control and business systems experience preferred. College grad helpful.

Ingersoll-Rand offers an excellent salary program and fringe benefits. Please send resumes including complete salary history and requirements in strict confidence to Denny Walker.

INGERSOLL RAND COMPANY

P.O. Box 868 Mocksville, N.C. 27028 (704) 634-3561

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• SENIOR PROGRAMMER/ANALYST • SENIOR SYSTEMS ANALYST • RETAIL SYSTEMS PROGRAMMER

Seeking challenge, innovation and the opportunity to impact on new developments in your career area? Then come to King's Department Stores, the New England based retailing leader, where major systems developments are currently in progress. And where the emphasis is on developing on-line data base and point-of-sales systems.

If your background includes COBOL programming experience on IBM equipment with or without exposure to DL1 and CICS concepts, and you are ready to advance your career in a highly professional environment, send your resume, including salary history, to: King's Department Stores, Inc., EDP Personnel Department, 150 California Street, Newton, MA 02158.

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On to the 21st Century with "The Office of the Future"

Software Professionals

Wordstream, the leading word processing system using advanced computer concepts to simplify business applications, is seeking software specialists in the following positions:

MANAGER, SYSTEMS SOFTWARE - A highly desirable position that calls for the effective coordination of activities with the Managers of Application Software, Hardware Development and Sustaining Engineering. The ideal candidate will be experienced in System Software and Architecture, Communications/Software, Operating Systems, System Analysis, Sustaining Engineering for System Software, Diagnostic Software and System Testing. Three to five years software management experience beyond project management level is desired.

FILE MANAGEMENT/DATA BASE SPECIALIST - A challenge this position will be designing micro-processor-based file management and data base management systems for text editing applications. It requires experience in minicomputer or micro-processor based file management systems. Actual experience in design and checkout of data base software is also needed, with 7-10 years programming experience.

COMMUNICATION SOFTWARE SPECIALIST - You'll be innovative in this job designing micro-processor based communications interface for text editing applications. Required experience is in analysis design and checkout of minicomputer based communication software, and must be familiar with computer communications protocols such as asynchronous, bisynchronous and similar computer communications protocols. Seven to ten years programming experience and familiarity with communications hardware is very desirable, as is packet switching and/or multi-dropped protocols.

Wordstream is a company that is always expanding activities, offering ground floor potential developing new systems. Salary and company benefits are generous and highly competitive. Focus your career on the future and send your resume and salary requirements to:

Ernest Ashford
Manager of Technical Staff
9901 South Wilcrest
Houston, Texas 77099



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PROGRAMMER/ ANALYST

A major expansion of our shop has created an outstanding opportunity for an EDP professional who is looking for a unique growth oriented challenge.

We are seeking a degreed individual with a minimum of 3 years experience in a manufacturing environment. Background must include extensive use of UNIVAC 1100 with DMS 1100 and TIP/CMS. Familiarity with UNIS would be an asset. ITT Blackburn Company offers the advantages of a medium-sized, people-oriented unit that is part of a major corporation. We are a company that encourages and rewards individual initiative and ability. Future advancement is therefore available as the company grows. Of course, excellent compensation and benefit programs will be offered. Please respond with a confidential resume that specifies salary requirements.

Personnel Department
ITT Blackburn Company
1525 Woodson Rd., St. Louis, MO 63114
An Equal Opportunity Employer (M/F/H)

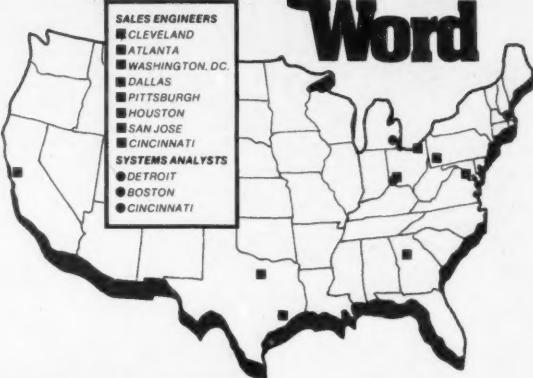
DIRECTOR DATA PROCESSING

We are seeking a qualified individual to plan, direct, and control all data processing activities for a major south-western teaching hospital. Applicants should have a bachelors degree in business administration, computer sciences, or a related field and a minimum of five years experience in the field of data processing. A proven track record in management is required. Prior hospital data processing experience is a plus.

The successful candidate will manage a staff of thirty and be responsible for the development and installation of a comprehensive hospital management information system. We offer excellent benefits. Salary is open based on experience. Send resume and salary history in confidence to:

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We're Looking For The Best SALES ENGINEERS And PRE-SALES SYSTEMS ANALYSTS In The Country

That's a solid statement, but we've got the backing to make it work. Since its birth in 1970, MODCOMP has specialized in the design, manufacture, marketing and servicing of high-speed, state-of-the-art computer systems, especially in real-time applications. MODCOMP'S systems are designed for ease of installation and reliable operation. Our international network of applications extends to four major markets: Process Industry Systems, Power Industry Systems, Manufacturing Industry Systems and Government Systems.

SALES ENGINEERS must be aggressive, hard-driving, results-oriented individuals with proven track records in their dedication to success. Locations available include: Cleveland, Atlanta, Washington, DC, Dallas, Pittsburgh, Houston, San Jose and Cincinnati. (Relocation benefits will be considered.)

SYSTEMS ANALYSTS are members of our sales team, working closely with Sales Engineers in technically selling MODCOMP'S software and hardware systems via product presentations, benchmarks, technical proposal preparation, etc. Locations available include: Detroit, Boston, and Cincinnati. (Relocation benefits will be considered.)

As a member of MODCOMP'S team you can be assured the support of our entire company — WE REWARD ACCOMPLISHMENTS! Our salaries, commission structure, expense program, benefits (including stock purchase and dental), and more are definitely state-of-the-art, too!

If an open-ended opportunity is what you've been looking for, send us a letter or resume, or call, toll-free, today.

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Modular Computer Systems, Inc.
1650 West McNab Road
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AN EQUAL OPPORTUNITY EMPLOYER M/F

EDP PROFESSIONAL

Highly respected research firm is staffing a young systems and programming function. We are looking for a strong Senior Programmer Analyst who is now ready to assume a challenging management position. You will organize our information systems area and be responsible for systems and program development.

Position is located in Los Angeles.

The ideal candidate must have a minimum of 5 years experience and be well versed in COBOL. Some familiarity with RPG a plus. Good resume and salary requirements in confidence to:

CW Box 1972
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Newton, MA. 02160
An Equal Opportunity Employer

Programmer/Analyst

Progressive newspaper publishing and commercial printing operation in Daytona Beach, FL, needs highly motivated individual able to work with minimal supervision. Must be experienced in design, development and implementation of accounting and manufacturing systems. COBOL necessary. RPG helpful. Experience with Univac Series 90 using OS/3 1 plus. Excellent fringe benefits including health insurance and company paid pension plan. Send resume with salary history, requirements to:

PERSONNEL DEPT.
NEWS-JOURNAL CORPORATION
P.O. BOX 431
DAYTONA BEACH, FLORIDA 32105
EQUAL OPPORTUNITY EMPLOYER

FINANCIAL/ PRICING ANALYST

The finance organization of Boeing Computer Services has an excellent position available for a person interested in pricing and competitive analysis.

The qualified candidate must be able to prepare automatic data processing cost proposals in response to RFP's for Federal, State, and Local Government agencies as well as commercial customers.

BS/BA degree or equivalent experience and training in preparing costing and pricing data for business proposals is required, along with a good working knowledge of ASPR, FPR and DOD. ADP experience on various operating systems (IBM 370 and CDC Cyber systems) helpful.

You will enjoy a salary commensurate with experience and ability plus a generous benefits package. For immediate consideration, please send resume including salary history, to:

Ms Sandra Stevenson

BCS

BOEING COMPUTER SERVICES COMPANY

A Division of The Boeing Company

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PROGRAMMER/ANALYSTS

Informatics, the largest independent supplier of commercial software services, is seeking job oriented individuals who will become part of our professional staff of Data Processing Consultants.

Challenging opportunities are available now in our San Francisco, Los Angeles, Dallas and Seattle offices for professional Programmer/Analysts with at least 1 year of experience in one or more of the following areas:

Languages	Software	Hardware
COBOL	IMS	IBM 360/370
FORTRAN	CICS	CDC 7600
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PL/I	TOTAL	MINIS

If you are a bright individual who enjoys client contact we want to hear from you. We offer diversified career development, paid overtime and a comprehensive benefits package. Please send your resume in confidence to:

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Spear Street Tower
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Scientific and commercial applications • Software development and systems programming • Telecommunications • Control systems • Computer engineering • Computer marketing and support.

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Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
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1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

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Join our rapidly growing field service company. We offer unlimited opportunity to those with potential; a full benefit package, top salaries and participation in Systec's future. We have immediate openings in Dayton, OH, Norfolk, VA, & Washington, DC. Openings in the Midwest and Southeast are in the immediate future. If you are ready for a company where your abilities and contributions will be recognized and rewarded; call today. Systec is a company dedicated to SERVICE TO THE CUSTOMER. At Systec you are not just a part of the company . . . YOU ARE THE COMPANY. Phone 800 327-4581, in FL 305 862-0203.

101 Wymore Rd Suite 205
Altamonte Springs, FL 32701

COMPUTER OPERATIONS PRODUCTION SUPERVISOR**Second Shift**

NATIONAL CENTRAL BANK, a billion dollar bank located in south central Pennsylvania, is seeking a production supervisor for our Computer Operations Department, second shift. The individual should meet the following qualifications:

- 2-3 Years experience OS/MVS TSO
- CICS exposure helpful
- Experience with multi-CPU environment
- DOS/VSE exposure helpful
- Prior supervisory experience
- 370/158 MP
- Exposure to VCI's production control system a definite plus.

This position will have total responsibility

Salary Commensurate With Experience

We offer excellent company paid benefits including profit sharing and a stock purchase option.

Qualified candidates should send a confidential resume and salary history and requirements to:

Tita Davis
Employment Manager
NATIONAL CENTRAL BANK
1097 Commercial Avenue
Lancaster, PA 17601
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PROGRAMMER/ANALYSTS**Be Seen By The Best...**

M.I.S. International has grown as a successful, highly regarded computer systems organization because of creative and ambitious professionals looking for a true challenge. We offer broad and diversified product line opportunities in **Manufacturing Systems, Laboratory Data, Acquisition Systems, Quality Audit Systems and Emission Systems**. In the long run, we believe the only question is:

IF YOU ARE THE BEST, WHY NOT WORK FOR THE BEST?

Because of the successful expansion of our services, we now have immediate openings in **Cleveland, Ohio; New York City; Washington, D.C.; as well as Southeastern Michigan** for:

- Mini/Micro Computer Systems Engineers and Real-Time Programmers with Systems and Programming experience in: IBM-S/1, PDP 11, Motorola G680, V74...
- Commercial Programmer/Analysts for IBM, Honeywell, Univac and Burroughs Systems.

We have an excellent starting salary for those with demonstrated expertise; regular increases are based on individual merit. Our benefit package is second to none, and relocation costs are provided. If you think that individual effort is important, and want to work for a company that agrees with you, call or send your resume to Mr. Ed. Lyons.



INTERNATIONAL INC.

"A Total Systems Company"

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WHY NOT THE BEST?

Based on your experience, education, and capabilities, do you now have the best salary, position, and career potential opportunity?

Does your company pay the best benefits? Are you in the best location? Are your skills being utilized to the best of your ability? If not; Why not?

We represent the best client companies in America through 63 affiliate offices from coast to coast specializing in DP Professionals who want only the best. A partial listing follows:

ROCKY MOUNTAINS	GULF AND ATLANTIC COASTAL
Programmers	Systems Programmers
Programmer Analysts	EDP Auditors
Systems Reps	Sr. Programmers
D.P. Mgt.	Programmers (COBOL)
Software Analysts	Mgrs of Systems & Programming
SUNBELT-SOUTHEAST & SOUTHWEST	MIDWEST
Programmer Systems Analyst	Sr. Programmer Analyst
Systems Analyst	Sr. Systems Analyst
Mgr. of Systems Support	Sr. Analyst
Project Leaders	Operations Research
Sr. Systems Programmers	MIS Director
	Operations Mgr.

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Send Resume or contact Jim Morgan at
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Memphis, Tennessee 38157 — 901-761-4560

A NATIONWIDE CAREER SERVICE FOR COMPUTER PROFESSIONALS

Programmer analysts, project leaders, systems programmers, IBM, Honeywell and minis. Salaries to \$40,000.

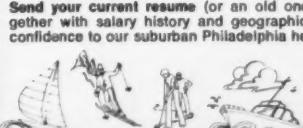
No fees or contracts. Our client companies pay all expenses. Career consultation prior to any action. Over 1000 EDP positions represented nationwide.

Send your current resume (or an old one with pencil update) together with salary history and geographic preference in complete confidence to our suburban Philadelphia headquarters . . . or phone:

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P.O. Box 14
Haverford, PA 19041
(215) 565-2920

Systems Personnel, Inc.

A NATIONWIDE CAREER SERVICE



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Senior Software/Hardware Design Architects

An invitation to join one of the most ambitious and creatively challenging System architecture undertakings ever launched at NCR.

NCR is now assembling what may well be the most able and farsighted architectural teams in the country. The primary mission of this group is to develop the major architectural concepts and standards which best satisfy the full spectrum of business data processing and communication requirements. The work it does—the decisions it makes—will be the basis of NCR's future far into the 1980's.

Next generation technology

As part of this highest priority pioneering effort you'll be shaping an entire new generation of transaction-oriented distributed processing systems. You'll be capitalizing on VLSI technology and the latest EDP concepts including state-of-the-art networking, distributed processing and new PASCAL-based languages.

Architecture in the broadest sense

You won't be simply modifying existing systems or solving narrowly defined problems. You'll be interacting with various engineering and software organizations within the corporation. Your strategic and architectural decisions will determine the requirements for multi-plant implementation of systems and subsystems. You'll have more creative freedom than you've ever had before.

Specific backgrounds needed

You'll be working at NCR's highest technical levels. We're seeking systems architects with experience in the following areas: open-ended multi-processing; distributed processing; network architectures; distributed data bases; transaction and interactive processing; concurrency control; backup and recovery; reliability-privacy-security; languages and protocol standards; and migration engineering.

San Diego Lifestyle

NCR's pioneer development group is located in Rancho Bernardo, 22 miles up the coast from San Diego. Our 115-acre hilltop headquarters has been called "one of the 10 best-designed industrial facilities in the nation". We'll give you a working and living environment that's the envy of the EDP industry.

Interviews arranged quickly

For a high level review of your qualifications, and a personal in-depth briefing on your future at NCR, send confidential resume and salary history at once to, or call collect (714) 485-2183, Mr. Frank Dredek, Manager, Personnel Resources, Dept. K50, NCR Corporation, Systems Engineering, 18550 W. Bernardo Drive, San Diego, CA. 92121. Mailbox 5000.



Complete Computer Systems

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PROGRAMMERS DALLAS/FT. WORTH SUBURBS

PharmAssist, the leader in on-line computer services for the pharmaceutical industry, has immediate need for programmers with two to five years experience. Openings exist in our on-line programming group as well as our large scale systems area. If you have experience in COBOL or FORTRAN with large scale HONEYWELL SYSTEMS or minicomputer assembly language experience, please send resume to:

CHARLES DAVIDSON, VP SYSTEMS
PharmAssist

1801 West Euless Blvd., Euless, TX 76039
or call collect: (TX. 817/469-2401) 800/433-1730

PHARMASSIST
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EOE/MF

Senior Systems Analysts Electrical Engineering & Business

Exxon Enterprises Inc., the dynamic new business development arm of Exxon Corporation, is working on the leading edge of electric power conversion systems research and development. This pioneering effort has strong implications for the future.

Right now we have career openings for two Senior Systems Analysts with directly related experience in the following:

Senior EE Systems Analyst-Computer Modeling

The Senior Engineering Systems Analyst we seek will work with our electrical engineering team in the implementation of computer modeling systems.

This requires computer systems experience in the areas of system specification, design, development and implementation. For the modeling of variable speed drive systems and motor simulation, a BSEE degree is extremely desirable. Knowledge of application programming using TSO on large IBM mainframes is considered a definite asset.

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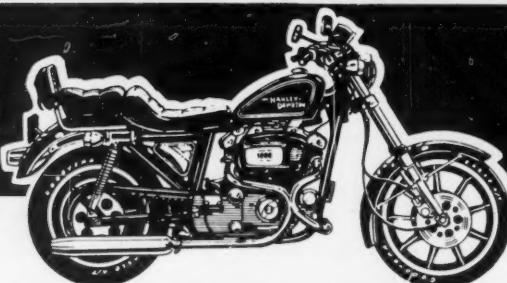
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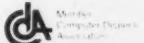
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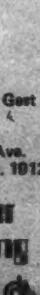
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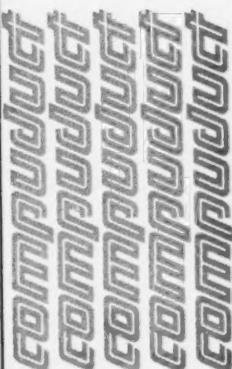
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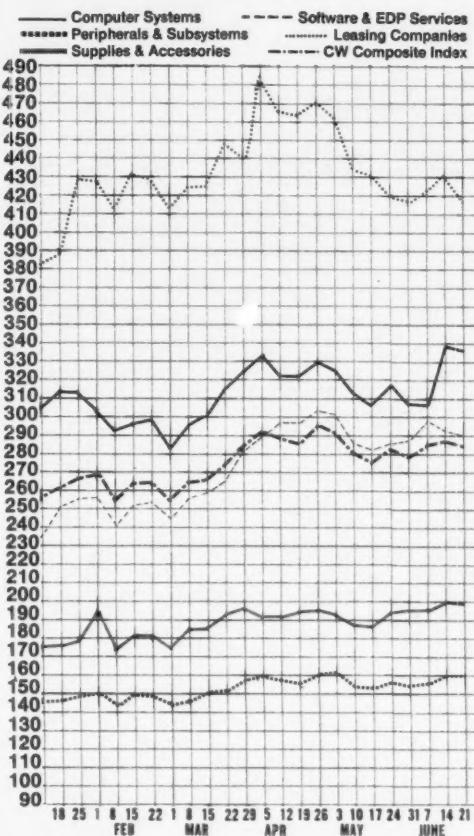
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1979 1978
Shr Endd \$2.22 \$3.31
Revenue 5,405,927 4,151,037
Earnings 165,013 262,695

DIGICON Three Months Ended April 30

1979 1978
Revenue \$9,486,000 \$6,800,000
Extd Loss -87,000
Loss 445,000 182,000
9 Mo Shr 11
Revenue 29,233,000 20,792,000
Tax Cred 95,000
Earnings (\$19,000) 222,000

a-Reversal of tax loss carryforward credit.

DOCUMENTATION Three Months Ended April 27

1979 1978
Shr Endd \$.60 \$.40
Revenue 19,820,000 11,117,000
Earnings 1,828,000 1,188,000

FLOATING POINT SYSTEMS Three Months Ended April 30

1979 1978
Shr Endd \$.18 \$.24
Revenue 7,597,000 5,822,000
Earnings 663,000 638,000
6 Mo Shr .09 .16
Revenue 13,183,000 10,741,000
Earnings 348,000 1,107,000

MATHEMATICAL APPLICATION Year Ended March 31

1979 1978
Shr Endd \$.33 \$.16
Revenue 2,894,794 2,046,791
Tax Cred 61,000 115,359
Earnings 338,853 257,447

MOHAWK DATA SCIENCES Year Ended April 30

1979 1978
Shr Endd \$1.10 \$.82
Revenue 178,262,000 152,629,000
Spec Cred 758,000
Earnings 9,553,000 6,259,000
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Earnings 2,934,000 40,938,000

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 20, 1979

All statistics compiled,
computed and formatted
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Cambridge, Mass. 02139

EXCH	PRICE				EXCH	PRICE				EXCH	PRICE			
	1978-79 RANGE (1)	CLOSE JUN 20 1979	WEEK CHNG	WEEK PCT		1978-79 RANGE (1)	CLOSE JUN 20 1979	WEEK CHNG	WEEK PCT		1978-79 RANGE (1)	CLOSE JUN 20 1979	WEEK CHNG	WEEK PCT
COMPUTER SYSTEMS														
A ANDALI CORP	24- 69 25	0	0.0	0.0	O ADVANCED COMP TECH	1- 2 1 1/2	- 1/8	- 7.6	- 7.6	A DATA ACCESS SYSTEMS	0- 10 9 5/8	+ 7/8	+ 10.0	
N BURROUGHS CORP	59- 87 69 3/8	- 1 7/8	- 2.6	- 2.6	O ANACOMP INC	8- 22 15 1/2	+ 1/2	+ 3.3	+ 3.3	A DATA PRODUCTS CORP	13- 25 15 1/4	+ 1/2	+ 3.3	
O COMPUTER AUTOMATION	13- 44 13	+ 5 3/4	+ 3.6	+ 3.6	O APPLIED DATA RES.	8- 17 18 1/8	+ 3/4	+ 6.8	+ 6.8	O DECISION DATA COMPUT	2- 6 3 7/8	- 1/8	- 6.0	
N CONTROL DATA CORP	23- 44 39 3/8	+ 1 1/8	+ 2.9	+ 2.9	O AUTOMATIC DATA PROC	24- 36 33 5/8	- 7/8	- 12.2	- 12.2	O DELTA DATA SYSTEMS	1- 1 3/4	+ 1/4	+ 5.0	
O CRAY RESEARCH INC	8- 39 36	- 1	- 2.7	- 2.7	O COMPU-SERV NETWORK	5- 16 16	+ 1/4	+ 12.2	+ 12.2	O DOCUMENTATION INC	0- 36 22 1/2	- 2 1/8	- 8.6	
N DATA GENERAL CORP	42- 73 71 3/4	+ 1/8	+ 0.1	+ 0.1	O COMPUTER HORIZONS	1- 9 4 1/4	- 1/4	- 2.5	- 2.5	O DATARAM CORP	6- 32 17 1/4	- 3/4	- 4.1	
N DATAPoint CORP	34- 62 77	+ 1/8	+ 0.1	+ 0.1	O COMPUTER NETWORK	5- 16 7 7/8	+ 7/8	+ 12.5	+ 12.5	O ELECTRONIC M & M	3- 9 4 1/4	- 1/4	- 8.3	
N DIGITAL EQUIPMENT	39- 56 55 1/4	+ 1 3/8	+ 2.4	+ 2.4	O COMPUTER SCIENCES	8- 17 12 1/2	+ 1	+ 6.6	+ 6.6	O FABRI-TEK	1- 2 1 1/8	+ 3/8	+ 50.0	
N ELECTRONIC ASSOC.	2- 13 13 5/8	+ 3/8	+ 3.3	+ 3.3	O COMPUTER TASK GROUP	1- 7 7 1/2	0	- 0.0	- 0.0	O GENERAL COMPUTER SYS	1- 3 2 1/8	0	0.0	
A ELECTRONIC ENGINEER.	9- 19 11 1/4	0	0.0	0.0	O COMPUTER USAGE	2- 4 2 1/2	- 1/4	- 11.1	- 11.1	O HAZEL FINE CORP	18- 17 13 1/2	- 3/4	- 4.1	
N FOUR-PHASE SYSTEMS	19- 46 33 3/4	+ 1/2	+ 1.5	+ 1.5	O COMPUTOR REP SVC	4- 10 7 1/4	- 1/8	- 2.5	- 2.5	O HARRIS CORP	17- 36 28 1/2	0	0.0	
N FOXBORO	28- 40 27	- 1/2	- 1.3	- 1.3	O COMSHARE	6- 26 23 1/4	0	- 0.0	- 0.0	O INFORIX INC	9- 11 6 3/4	- 3/8	- 5.2	
O GENERAL AUTOMATION	7- 28 13 3/4	+ 5/8	+ 4.7	+ 4.7	O CULLITANNE CORP	14- 33 19 1/2	- 1/2	- 2.5	- 2.5	O INFORMATION INTL INC	7- 12 9 1/2	- 1/4	- 2.5	
O GRI COMPUTER CORP	1- 3 1 1/4	0	0.0	0.0	O DATADIMENSIONS INC	3- 9 2 7/8	0	- 0.0	- 0.0	O INFOTON	1- 3 3	+ 1/3	+ 4.0	
N HEWLETT-PACKARD CO	62- 97 95 3/4	+ 1/8	+ 0.1	+ 0.1	O DATATAB	1- 4 2 3/4	- 1/8	- 4.3	- 4.3	O INTEL CORP	26- 50 48 1/4	- 1	- 2.0	
N HONEYWELL INC	43- 76 59 1/4	+ 5/8	+ 0.8	+ 0.8	O ELECTRONIC DATA SYS.	15- 25 23 3/4	+ 3/4	+ 3.2	+ 3.2	O INTERSIL	7- 18 15 7/8	+ 1/8	+ 0.7	
N IBM	73-321 73-321	- 2 3/8	- 1.0	- 1.0	O INSYTE CORP	1- 3 1 1/4	0	- 0.0	- 0.0	O LUMONY ELECTRONICS	4- 8 6 3/4	- 1/4	- 3.5	
O MANAGEMENT ASSIST	9- 29 19 3/4	+ 2 5/8	+ 1.3	+ 1.3	O INSTEEL COMPUTER MARKET.	2- 3 3 1/4	0	- 0.0	- 0.0	O MSI DATA CORP	8- 19 9 1/8	- 1/4	- 2.6	
O MANUFACTURING DATA S	9- 25 24 1/4	+ 1/2	+ 2.1	+ 2.1	O INSTITUTE ASSOCIATES	3- 6 4 3/4	- 1/4	- 1.7	- 1.7	O MEMOREX	27- 59 29 1/4	+ 2	+ 7.3	
O MICRODATA CORP	10- 29 27 3/4	+ 1/4	+ 0.8	+ 0.8	O KEYDATA CORP	1- 4 3 1/4	- 1/8	- 3.7	- 3.7	O MOHAWK DATA SCI	6- 15 10 1/2	- 1/4	- 2.3	
O MINI-COMPUTER SYST	4- 8 5	0	0.0	0.0	O LOGICON	10- 19 13 3/4	+ 1/4	+ 1.8	+ 1.8	O OMEX	2- 8 6 1/2	0	0.0	
O MODULAR COMPUTER SYST	7- 18 12 1/2	+ 1 1/4	+ 11.1	+ 11.1	O NATIONAL CSS INC	15- 48 47 3/4	0	- 0.0	- 0.0	O PARADYNE CORP	9- 18 15 7/8	+ 1/2	+ 3.2	
N NCR	37- 72 69	+ 1 3/8	+ 2.0	+ 2.0	O NATIONAL DATA CORP	7- 13 18 1/2	- 1/8	- 1.1	- 1.1	O PENRILL CORP	5- 12 12 3/8	+ 1/2	+ 13.7	
N PRIME COMPUTER INC	9- 22 17 3/8	0	0.0	0.0	O ONLINE SYSTEMS INC	12- 30 21 1/2	- 1/8	- 5.5	- 5.5	O PERTEX CORP	8- 17 7 1/2	- 5/8	- 5.0	
N PDP-11	11- 38 29 1/4	- 1/4	- 0.8	- 0.8	O PLANT & PROCESS	9- 10 20 5/8	+ 1/8	+ 0.0	+ 0.0	O PRECISION INSTRUMENT	2- 2 3 1/4	0	0.0	
N SPCRY RND	33- 41 44 3/8	+ 1/4	+ 3.7	+ 3.7	O PROGRAMMING SYS	1- 1 1 1/4	+ 1/4	+ 11.1	+ 11.1	O RECOGNITION EQUIP	7- 13 6 5/8	- 3/8	- 5.3	
A SYSTEMS ENG. LABS	11- 24 12	- 1/4	- 3.2	- 3.2	O RAPIDATA INC	3- 7 4 7/8	- 1/2	- 1.7	- 1.7	O SCAR DATA	1- 5 2 1/2	- 1/8	- 8.1	
O TANDEM COMPUTERS INC	13- 37 38	- 1/4	- 4.0	- 4.0	O REYNOLDS & REYNOLD	10- 36 28 1/2	- 1/2	- 1.7	- 1.7	O STORAGE TECHNOLOGY	17- 46 18 3/8	+ 1/8	+ 6.5	
N U.S. LEASING	6- 22 21	+ 2 7/8	+ 15.8	+ 15.8	O LOGICON	10- 19 13 3/4	+ 1/4	+ 1.8	+ 1.8	O T BAR INC	11- 22 17 3/4	- 1/2	- 2.7	
LEASING COMPANIES														
O BOOTHES COURIER CORP	13- 21 17	- 1/2	- 2.8	- 2.8	N ADDRESSOGRAPH-MULT	13- 32 15 3/4	+ 3/8	+ 2.4	+ 2.4	O TALLY CORP	4- 14 12 1/2	0	0.0	
O COMDISCO INC	3- 21 16	- 1/2	- 3.0	- 3.0	N AMPEX CORP	10- 19 16	- 1/8	- 0.7	- 0.7	O TEC INC	6- 13 6 1/2	- 3/8	- 5.4	
A COMMERCE GROUP CORP	1- 1 1/2	0	0.0	0.0	N ANDERSON JACOBSON	5- 10 7 5/8	+ 5/8	+ 8.9	+ 8.9	N TEKTRONIX INC	33- 57 59 5/8	- 5/8	- 1.2	
A COMPUTER INSTRNS GRP	1- 7 3	- 1/4	- 7.6	- 7.6	N APPLIED DIG DATA SYS	8- 22 8 3/4	+ 1/8	+ 1.8	+ 1.8	N TELEK	3- 9 4 3/4	- 1/8	- 2.5	
O CONTINENTAL INFO SYS	5- 15 5 1/2	- 1/4	- 4.3	- 4.3	N BUREAU-RANNO	6- 14 13 1/2	- 1/2	- 3.0	- 3.0	N TESDATA SYSTEMS CP	9- 26 16 3/4	- 3/4	- 35.3	
N DATRONIC RENTAL	1- 4 3 5/8	- 1/8	- 3.3	- 3.3	N CALCOMP	10- 29 24 5/8	0	- 0.0	- 0.0	N WILTEK INC	1- 2 3/4	0	0.0	
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N ITEL	8- 18 11 3/8	+ 1/4	+ 2.2	+ 2.2	N CENTRONICS DATA COMP	16- 48 47	+ 4/3	+ 11.2	+ 11.2	A BALTIMORE BUS FORMS	1- 4 1 0	0	0.0	
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